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ABSTRACT

In recent years much has been written on the subject of nurse staffing but few attempts have been made to integrate the literature and show relationships between the methodologies. This document is an effort to synthesize and critically examine the major methodological research studies in the field of nursing. Included are: (1) a bibliography of over 1,000 staffing studies, (2) a glossary of terms used in staffing research, and (3) an historical development of nurse staffing studies from which was developed a framework for classifying the staffing methodology. A complement to a previous report released in 1972,, the publication is intended as an aid for improving the use of nursing manpower and may be especially helpful to nursing administrators and practitioners. (Author/SN)

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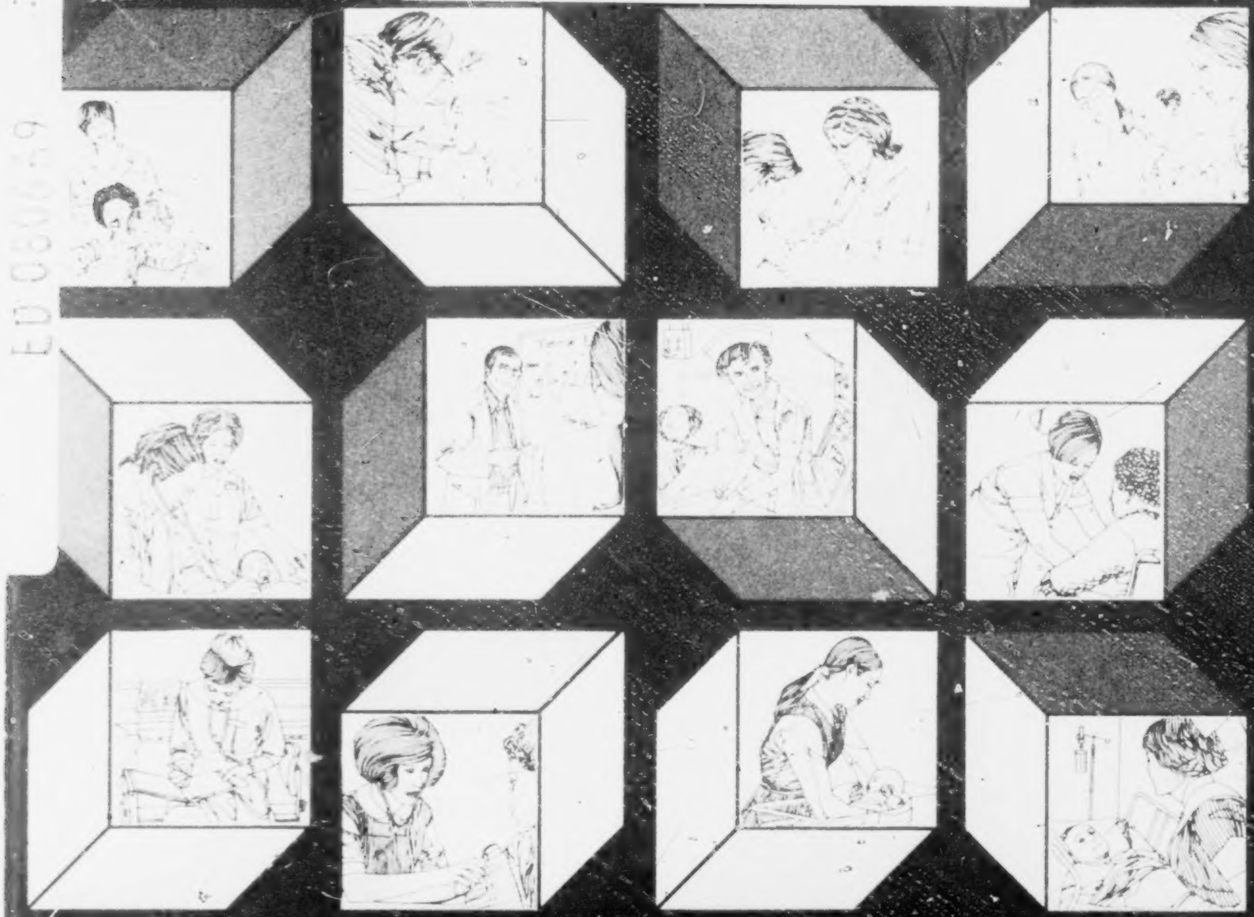

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urse Staffing Methodology

A Review and Critique of Selected Literature

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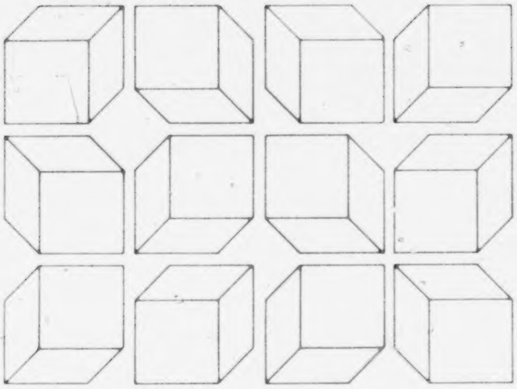

Nurse Staffing Methodology

A Review and Critique of Selected Literature

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Foreword

In recent years much has been written on the subject of nurse staffing methodology. However, few attempts have been made to integrate this literature or to show how one methodology relates to another.

This publication goes a long way toward correcting these deficiencies. It contains detailed, critical assessments of nearly 200 major methodological studies in the area of nurse staffing and a comprehensive bibliography of more than 1,000 staffing studies. In addition, it presents an historical development of nurse staffing studies, provides a framework for classifying staffing methodology, and contains a detailed glossary of terms used in staffing research.

The Division of Nursing has long been involved in the development of staffing methodology with the aim of improving the use of nursing manpower. Much of the work reported in this publication was done by members of the Division or by researchers supported by Division grants or contracts.

This publication should be useful to all concerned with problems of nurse staffing. Administrators and practitioners should find valuable information about tools and techniques useful in solving such managerial problems as allocating and scheduling personnel, assessing quality of performance, and determining nursing workload. Educators and students will find a wealth of material on major aspects of nursing service administration. Researchers are provided a comprehensive sourcebook on completed research on staffing methodology, as well as a guide to future research in this area.

This publication is a companion volume to the Division's report of a conference on research on nurse staffing in hospitals held in May 1972. The report, *Research on Nurse Staffing in Hospitals: Report of the Conference*, contains papers elaborating and updating many of the topics included in this publication on nurse staffing methodology. These two documents will complement each other and contribute to the literature on nurse staffing methodology.

Jessie M. Scott

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Assistant Surgeon General
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The project owes its very existence to Marie R. Kennedy, Nurse Consultant, Division of Nursing, National Institutes of Health, who originally conceived the project and who provided assistance and support in its conduct. It was she who approached me with the intriguing problem of studying the literature and who negotiated the details of the contract. We share a deep interest in the problems of nursing care delivery and a concern about the use of logical approaches to planning for staffing.

It is my hope that through this review of literature and the synthesis of methods and findings more knowledge will come to light. The intent is to help directors of nursing, now and in the future, find ways of solving one of their most perplexing problems, staffing. The solution must be logical, economical, and rational. Without more knowledge, the solution will remain elusive, and the problem will continue to be baffling.

Myrtle K. Aydelotte
Project Investigator

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THE PROBLEM OF NURSE STAFFING METHODOLOGY: ITS ANALYSIS AND A SYNTHESIS OF FINDINGS

Section I

Chapter 1

Introduction

Definition of the Problem

The problems of nurse staffing in hospitals and other care delivery systems are well known to the public and are keenly felt by hospital administrators and nursing administrators. Through various communication media, the consumer has also become aware of shortages of personnel, high cost of nursing services, work overload of nursing staffs, and mobility of professionals. Directors of nursing service and their associates have indicated that staffing problems take a large proportion of their time, although they believed that this is an aspect of their work to which less time should be devoted.(*1*)[1] Hospital administrators, physicians, consumers, and board members responsible for the overall policies governing hospitals, all share in the concern about nurse staffing and its relation to the spiralling costs of health services, the desired efficiency of the staff, and the rendering of health care which is acceptable in quality and therapeutic in its effect.

There is limited knowledge about approaches to staffing: the nature and extent of the ways by which nursing staff requirements can be predicted. What an individual reflects in a discussion of staffing depends upon his orientation to the problem. For example, manpower supply, frequently discussed, is only one facet of the total problem of staffing. It is an exceedingly important one. However, what is not readily known and less frequently considered are the various methodological approaches to nurse staffing determination and the ability of these approaches to adapt to changes in the health care delivery system.

Nurse staffing methodology should be an orderly, systematic process, based upon sound rationale, applied to determine the number and kind of nursing personnel required to provide nursing care of a predetermined standard to a group of patients in a particular setting. The end result is prediction of the kind and number of staff required to give care to patients. This prediction of the number and kind of personnel to give nursing care 24 hours a day, 7 days a week, to a group of patients is no small task. The aim is to provide, at reasonable cost to the general public the agency serves, a standard of nursing care acceptable to its clientele and the nursing staff serving it. From community to community this clientele will differ in its expectations. The expectations are dependent upon availability of money, the standard of culture of the clientele, and the value system held by that group. The services accepted by one group may be highly unsatisfactory to another. Minimal custodial care, with safeguards for safety, may be acceptable to one set of individuals; highly personal service may be demanded by another. However, the changes and trends occurring in our society today centered upon the rights of the individual to health care may change the standards and influence the amount and kind of staffing expected.

The beliefs and values of the nursing staff of a hospital influence greatly the staffing predictions. The philosophical orientation of the nursing personnel, the perception of nursing practice and its components, the expectations of effects to be achieved, the workload tolerated—all these will influence the amount and kind of staff seen as being necessary to do the job.

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[1] Italic numbers in parentheses apply to references listed at the end of the chapter.

The amount of sophistication in research among nursing staffs in institutions ranges from a negligible to a large amount. Furthermore, the nursing care needs of patients vary from institution to institution. For these reasons, the selection of the particular methodology may be dependent upon the readiness of nursing staff and hospital administrators to make use of it.

What is needed is a set of methodologies from which can be selected for use that one methodology most appropriate for the institution engaging in the study of its staffing needs. The methodology may be in the form of models or may appear as statements serving as guidelines or as formulae, based upon as much data as possible. At this stage in the development of staffing approaches and methodologies, knowledge about the variables that may influence staff requirements is elusive and vague. However, some knowledge is available. It is the purpose of this review to assist in the identification of what is known about the subject, to suggest new approaches or methodologies, and to state directions for additional study and investigation.

Background of the Problem

In a consideration of the review of present day methodologies and what should be available for future, it is well to review both the history of nurse staffing and its evolving complexity and the present and future design of the health care delivery system.

The need for more sophisticated and rational nurse staffing methodologies is apparent from trends in the health care delivery system. Approaches to staffing methodologies have been in existence for at least half a century. A review of the history of nurse staffing and its evolving complexity will clarify the origin of some features of the present problems of staffing and reveal the characteristics that must be considered in its resolution. A survey of trends in health care delivery systems will explain the urgency of the need for solutions to nurse staffing difficulties.

History of Nurse Staffing and Its Evolving Complexity

A review of the literature on the subject of staffing reveals interweaving of many topics. In particular it focuses on three: (a) the relationship between the development of nursing service as an entity in itself and the growth of nurse training programs; (b) the establishment of standards for practice, education and service; and (c) the evolvement of other groups within the general occupations of nursing. In the close relationship that exists among these, it is impossible to isolate one topic for separate consideration. In a review of staffing, all merit attention. A brief history of nursing reveals a number of important features that must be considered in a study of nurse staffing methodology.

Composition of nursing service staffs and use of manpower.—First, since the origin of hospitals, the nursing services have been characterized by their composition of more than one level of worker. From the very beginning of nursing as an organized service, even in its most rudimentary form, there were individuals who served as nurses but were not formally trained. The nurse attendant existed long before the trained nurse.(*2*) In 1872, the "first class of 'trained nurses' was graduated from the New England Hospital for Women and Children." By 1900, there were 432 schools of nursing with programs that varied from 6 weeks to 3 years.(*3*) During the first decade of the 20th century, many more hospitals organized schools as a means of saving money and of improving care to patients.(*4*) Hospitals were soon staffed almost entirely by students and attendants with a few trained nurses acting as head nurses or supervisory nurses.

It was not until 1918, however, that concern about manpower supply and its relation to utilization became evident. The first national nursing census was taken that year. To meet the increased demands for nursing services during World War I, the American Red Cross proposed a program for nurse aides. It was not approved. Instead, the national organizations supported the establishment of an Army Nurse Corps and a training school for it. The profession was not prepared to officially endorse the services of a second level of nursing personnel such as the aide program offered.(5)

It was not until the Goldmark Report appeared in 1923 that the need for supporting personnel became openly recognized. The Goldmark Report resulted from a survey of the entire nursing field occupied by the nurse and related workers. The purpose of the study was twofold: to identify the tasks performed and the qualifications necessary for their execution and to establish the minimum educational standards for each type of nursing service for which there appeared to be a vital need.(*6*) Six major recommendations relating to nurse staffing were proposed. These were:

- the school and the hospital should operate on separate budgets;
- the length of the program should be shortened by reducing noneducational routines;
- subsidiary workers should be given preparation and be licensed to provide under supervision the care of specified types of patients;
- postgraduate education for public health nurses, supervisors, and educators should be provided; and
- university schools of nursing should be developed and strengthened, since this type of educational opportunity was fundamental to the upgrading of nursing.

Due to lack of publicity about these findings, the report was not used as anticipated and little was accomplished in the implementation of these recommendations.(*7*)

Three years later, in 1926, since reform of nursing education was slow and the need was obvious, the American Nurses' Association (ANA) organized the Committee on the Grading of Nursing Schools. Its purpose, to gather information for improving the quality of nursing education, soon expanded to study "ways . . . for measuring an ample supply of nursing service of whatever type and quality . . . needed for adequate care of the patient, at a price within his reach."(*8*) Although the findings disclosed that shortages existed for certain types of nursing, the general result indicated an actual surplus. The major problem revealed was the need for raising standards of nursing because the shortage was in quality, not quantity.

The report, frequently referred to as the Burgess Report, revealed a number of highly relevant findings: (a) there was no standardization for private nursing practice; (b) general staff nursing was the least popular of all types of nursing; and (c) most hospitals preferred students to graduate nurses because they were cheaper, more available, and easier to manage in assignments and discipline. The authors predicted that staff turnover might decrease with salary increases, with the establishment of an 8-hour day, with the introduction of the 5½ or 6 day week, and with adequate staffing to share the workload. The study proposed two highly significant areas of research:

(a) cost accounting of nursing service; and
(b) surveys to establish desirable ratios of doctors and nurses to the population.(*9*)

Concurrent with the appearance of this report, the trend to hire more graduate nurses for staffing was apparent. This movement to employ staff nurses was accelerated by several factors. There was a high rate of unemployment among private duty nurses during the early 1930's. Many nurses needed jobs. The introduction and development of technology and drug therapy required a higher level of staff preparation in order to assure safety to patients. Hospital insurance plans were enlarging so that individuals holding insurance policies expected a higher level of care since they could meet the cost of service through the insurance benefits.(*10*)

During World War II, the demands of the Armed Services for nursing staff depleted civilian hospitals of staff and accelerated the recruitment of auxiliary workers for nursing services. The utilization of aides gained momentum as individuals who started as volunteers in hospitals to help with care of patients gained acceptance. Later, some of the volunteers and others became salaried employees, establishing recognition of the aide position. By 1944, "fifteen States had provisions for licensure of some kind of auxiliary personnel".(*11*) In 1949, the National League of Nursing Education published a detailed methodology for aide assignments. Patients were classified according to five factors: degree of illness, control of activity, behavior reaction, application of therapy, and teaching and rehabilitation. This tool assisted nurses in making out patient assignments to their aides and identified where best use of professional time could be made.(*12*)

During these years and the earlier ones as well, nursing was continuously plagued with problems of securing economic status to match its services. A change in nursing, and one felt by hospitals and the public in planning staffing, resulted from the ANA economic security program initiated in 1946.(*13*) The rationale underlying its introduction is logical and its goals admirable. The program's impact on staffing was predicted to increase productivity and utilization and to encourage careful analysis of costs.

The experience of individuals concerned with health care during World War II and the years immediately following led to recognition of the fact that changes in nursing practice, education, and delivery were in order. A major remodeling of both nursing education and practice was needed. In 1948, three significant writings made their appearance. Each was related to staffing. The first, *Nursing for the Future* by Esther L. Brown, viewed the method by which the profession could best serve society's needs. In her deliberations, Dr. Brown proposed a new conceptualization of the professional nurse practitioner, placing major emphasis upon her performance of practice and use of her in a highly professional practice role in care and therapy. She endorsed the concept of a second level of worker, the licensed practical nurse, in health services.(*14*) The second, *A Study of Nursing Service*, included factual data and guidelines for nursing services.(*15*) It identified the types, educational preparation, and duties of nonprofessional workers giving direct nursing care. The guidelines were developed from a study that analyzed the nursing care hours per patient in hospitals and the method of combining different levels of personnel for staffing purposes. The third, the Ginzburg Report, arrived to likewise clarify the role of nursing and to pinpoint where the current and prospective shortages of personnel existed. Many pertinent statistics were given. For example the author reported that there were 280,500 active registered nurses of whom only 167,400 were in institutional nursing. In addition, 120,000 practical nurses and attendants worked in hospitals, but 10 percent or less of these had been trained in approved schools.(*16*) Among its other findings, it stated that poor utilization of nursing personnel was a critical problem. The concept of "nursing team" as a new arrangement in staff utilization was introduced by Ginzburg. Eleanor Lambertsen later popularized this concept in patient care in her report *Nursing Team Organization and Functioning*, 1953.(*17*) The organization of rôles within the nursing care subsystem that she presented became a model for many hospitals.

As nursing functions and responsibilities expanded, delegating the less skilled aspects of care to the nonprofessional team workers seemed logical. However, there had not been controlled experiments conducted for the purpose of examining the means of differentiating activities for each staff level on the team or establishing the proportions of professional to nonprofessional members on the team. In 1951, Bredenberg reported on experimental studies to make economical use of the integrated nursing team.(*18*) The series of approaches she used included a job analysis of each position, a functional analysis of the staff when using the team plan, a time analysis of nonnursing activities of the staff, and analysis of ratios of different levels of personnel on the team. Several useful findings are reported. A 1:2 proportion of professional to nonprofessional personnel was favored by the staff. Regardless of team ratio, approximately one-half of the average nursing hours per patient were purely nursing service activities (not direct patient care). The recommendations she included for adopting the team concept referred to such essentials as adequate preparation of each level of worker, provision of a job description for each, and a plan of supervision to maintain team functioning.

Although the team nursing concept improved the status of practical nurses, the concept of a second level of nursing personnel was accepted reluctantly. In 1950, the Vocational Education Division of the U.S. Office of Education prepared a job analysis and the guidelines for organization of training programs, but the lack of uniformity in the legal requirements for State approval of these programs was a hindrance to its full adoption. Gradually, the licensed practical nurse has become fully recognized as having a legitimate place in nursing services.

The classic work *Patterns of Patient Care* (A156) published in 1955 studied which functions could be delegated safely to nonprofessional personnel, a method of preparing personnel as well as a method of assignment of personnel. The functionings of the ward clerk, the nurse's aide, and the practical nurse were individually analyzed. Nine group patterns, involving four different sizes of patient groups, were evaluated to determine the number of patients one professional nurse can work with effectively and to ascertain the most efficient combination of staff.(*19*)

These few studies indicate that there has been a gradual increase in types and numbers of persons in nursing services. This increase in workers has been accentuated by inability of the professional nurse pool to meet the demand for services, by change in the concept of how her talents are to be used, by changes in technology, and by costs. There is a trend, however, to prepare all workers in nursing services through some type of well designed training program.

The image of nursing services.—Second, although there was a close relationship between nursing education and nursing service at the beginning of nursing as an educated occupation, there has gradually developed over the years an image of nursing services as a separate entity in itself. As a separate subsystem within the larger corporate system of a hospital, the department of nursing is now seen as a major unit involved with complex and essential staffing to the hospital. However, the close relationship between changes in the nursing educational system and changes in the nursing delivery system is documented. Staffing methodology must take into account what is occurring in health professional education. In predicting what is required to staff, one cannot ignore what is produced or not produced in educational programs.

The American Medical Association (AMA) reported in 1909 that there was no evidence of any systematic effort to provide hospital service to the public.(*20*) In this period of the early 1900's, hospitals had "neither an established hospital system nor a generally accepted code of administrative and fiscal policies on which to build either a system of nursing education or one of nursing service."(*21*)

The post World War II evolution in nursing roles and the nursing team was accompanied by changes in administration through the adoption of concepts and principles of administration and management and engineering techniques such as work measurement and simplification. Up to this time, little had been written about the administration of nursing except in relation to nursing schools.(*22*) In 1951, the Kellogg Foundation provided funding to 14 universities for 2- to 5-year programs for improvement in the preparation of administrators of nursing services.(*23*) The effect made a major impact on the establishment of nursing services as a major department in hospitals and on the upgrading of the administration of those departments.

The nursing studies in the fifties covered a range of topics from regional nursing programs, management techniques, and job analysis, to the study of floor plans and facilities. One of the largest series of studies was launched by the ANA in 1950. It was a 5-year program of studies on nursing functions, many of which utilized industrial time-study methods focusing upon the bedside nursing activities. Thirty-four such studies were made during the years 1951–57. These studies served as a basis for the ANA statements of functions, standards and qualifications that were used in the administration of the programs of the ANA.(*24*)

Early approaches to methodology.—Third, the approaches to staffing found in the early literature were expressed in ratios of patients to numbers of personnel and in numbers of nursing care hours per patient day. The techniques of studying ways to staff or to collect data have included the use of time studies, time and motion studies, functional studies, and the usual hospital statistics. Time studies were the first introduced. Gradually, other management techniques have been applied to the study of nursing work.

The post World War I decade was noted for its increase in collegiate nursing education, the expansion of public health services, and its fact-finding studies. These studies were primarily descriptive, making specific recommendations about manpower supply and preparation but not proposing standards of staffing or service or ratios of personnel.

In 1922, the New York Academy of Medicine published the first time study of institutional nursing. There were four significant findings. Student assignments were often dictated by needs of the nursing service rather than the educational needs of the student. There was no hospital in New York City that had figures to show whether or not its school was an economic asset or liability. Fifty-seven percent of the nursing work in the hospitals was done by students, 36 percent by graduate nurses, and 7 percent by "the sub-standard variety." It was stated that an adequate amount of bedside nursing per patient was 5 hours and 4 minutes in a 24-hour period. However, none of the New York City Hospitals reached that standard of nursing care hours per patient day.(*25*)

It was not until 1928 that a fairly comprehensive paper on nurse staffing in hospitals appeared. The address, "Distribution of Nursing Service in Hospitals," by Marian Rottman, Director, Nursing Service, Bellevue and Allied Hospitals, reported the results of a questionnaire survey and also the findings of the work by several other individuals, such as Dr. P. S. Rawls, a committee of the American College of Surgeons, Gladys Sellow, and Margaret Tracy. The paper stated that ratio of staff to patient varied greatly among institutions. Miss Rottman commented that the best study undertaken was that by Margaret Tracy, who "has been able to present a chart outlining the average time required per treatment in minutes, for 21 procedures common to surgical patients."(*26*) Miss Tracy found that "in a ward of 25 surgical women patients, an adequate nursing staff comprised 8.10 graduate nurses whose weekly schedule was 44 hours; or 9.6 affiliating students whose weekly schedule was 44 hours; or 13.2 Yale nursing students whose weekly schedule was 32 hours."(*27*)

Interest in improvements in nursing staffing continued. A major milestone for nursing practice was passed when in 1936 the "Manual of the Essentials of Good Hospital Nursing Service" was published by the National League of Nursing Education and the Division of Nursing of the Council of the American Hospital Association (AHA). The manual provided data and guidelines, such as:

- the average number of bedside nursing hours per patient per 24 hours in eight different age or disease categories;
- the preferred ratio of graduate nursing hours to student bedside hours;
- the number of patients per day per head nurse, per orderly, etc.; and
- job descriptions of all nursing personnel.(*28*)

For the first time in the history of nursing, hospital administrators and directors of nursing had guidelines to staffing that included standards of performance, qualification, and policies on salaries and working conditions.(*29*)

The other nursing studies of the thirties focused on the institutional staff nurse, her hours, salary and other personnel policies affecting work satisfaction. In 1938, the ANA study of "Income, Salaries, and Employment" included specific recommendations for improvement in the economic aspects of staff welfare.(*30*)

The period after 1940 to 1960 indicates an increase in studies relative to nursing practice, service, and education, and an emphasis upon the importance of meeting the problems of nursing care delivery through the provision of adequate manpower supply and through better utilization.

Although the literature reveals that staffing methodologies had been in effect prior to 1960, the literature also conveys that the approaches were not highly sophisticated. The variables thought to be operating were many. Furthermore, except for one study prior to 1951, the effectiveness of various combinations of staff remained unexamined.

These findings indicate that any proposal regarding staffing methodologies must deal with the historical residual. A change in use of types of workers, either the elimination of the position or combining several positions to reduce super-specialization, will, because of the long history of its existence, create a wave of reaction. A methodology employing time and motion studies, job analysis, functional analysis, and ratios of nursing care hours per patient days will find most nursing administrators comfortable with the terms. If it deals with variables other than the more familiar ones, its sponsors may encounter problems of interpretation. If the assumption is made that the whole subject is new, the individual making that assumption will commit a serious blunder.

The Health Care Delivery System

It is seen that a rudimentary approach to nurse staffing methodology existed early in the history of nursing services—that prior to 1960. The detailed literature review concerning the health care delivery system included only the last and present decades.

To examine feasibility of methodologies, one must look at the health care delivery system as a whole. Before exploring the future direction of the health care delivery system, it is well to examine the trends currently appearing in the field of health care and to isolate the major issues confronting decision makers concerned with proposals for changing the present system. A review of these will give an overall view of how the present system is functioning and the type of pressures being exerted to change the nature and character of it.

To be feasible, staffing methodologies must be amenable for use in more than one setting. Furthermore, if the delivery system develops into an integrated system, the methodology must take into account those variables common to each type of unit and those that differ, yet must maintain a standard appropriate to each setting and to the whole system, thereby establishing logical relationships between each individual unit and the whole. This standard applies also to cost of staffing. If cost of staffing one unit is greater than another, the cost must be justified in relation to the whole, not just to the cost involving the individual unit.

Three major issues.—The first major issue revolves around the gap between the role for which medical education prepared the physician and some of the roles he will practice in the community. Present day medical education focuses upon medical and basic research and upon teaching excellence in care of patients during the acute phase of illness. Only a limited education is offered the medical student to prepare him to care for patients with common illnesses, or to assist those requiring rehabilitation, or to help individuals who wish to remain well. The present day medical educational system prepares physicians to give highly specialized care in sophisticated medical centers.*(31)(32)(33)(34)* The issue is whether or not this system will be continued.

The inequitable distribution of health care among the different social economic classes and geographic areas is the source of the second issue.*(35)(36)(37)* The care delivered to minority or poor groups in rural or urban areas has been characterized as greatly fragmented. It is often provided in overcrowded clinics or in poorly staffed and ill-equipped emergency rooms. This ill conceived and poorly delivered health service has resulted in special health problems. "The slum Negro has a life expectancy several years shorter than the average U.S. white; infant mortality is three times higher for blacks and four times as many black women die in childbirth."*(38)* Rather than the ratio of one physician to 700 persons, the ratio in the ghetto around Johns Hopkins Hospital is one to 66,000. Representatives from low income, rural and urban, and minority groups at a National Consumer Health Conference identified "a lack of community control in health services as the most serious block to relevant medicine for the poor."*(39)* So the scientific advances and improved medical treatments do not reach each segment of the population in equal time or in equal proportion or in equal amount of continuity. The question is whether or not this practice of unequal health care treatment will be perpetuated. If not, how will it be changed?

The third issue is centered on cost of the health care services. The costs of the limited services already accessible to the public are sky-rocketing. For the Nation as a whole, health expenditures, excluding medical and health education, increased 44 billion dollars from 1950 to 1968. Today's health care consumers, the majority of whom have gained higher life expectancy, better education and a higher income base, logically expect more and better health services at a reasonable price. Instead, the consumer finds higher premiums on insurance coverage that pays for a limited number of health services. Fragmented health programs within the U.S. Department of Health, Education, and Welfare (HEW) and the private sector all add to the chaos.*(40)* Health insurances have exacerbated the consumer's cost of care by encouraging hospitalization for services that could be given as well and at less cost in outpatient or community facilities.*(41)* Quality improvements, greater use of facilities, and other factors accounted for a little over one-third of the increase, but nearly one-half was due to price increases or inflation. Although approximately 80 percent of the population in 1968 had some degree of insurance coverage, about two-thirds of the poor had no insurance.*(12)*

An underlying factor in inequitable distribution of health care is the lack of coordination of the health care resources in communities. The physicians, the hospitals, and the community services appeared to be three separate sectors. Each of these is separately organized, administered, and funded. Referrals from hospitals to other levels of care facilities are often haphazard. Supporting services used by these three may be duplicated unnecessarily, while some services may not exist. These factors, plus the rising costs of highly qualified personnel, expensive technological developments in equipment and services, and diffuse management significantly contribute to the explosive rise in hospital costs.*(43)(44)*

These issues have not been resolved. However, scientific, social, and financial pressures are demanding better utilization of manpower and facilities and improved coordination among the various levels of health care services, in hope of providing comprehensive care to more people at a reasonable cost. Evidence of society's impatience with our present health care delivery system is a growing pressure for major representation of the consumer on policy boards of health agencies; the epidemic of legislative investigations, suggesting restrictions related to cost; and the growing number of proposals for some type of national comprehensive health insurance.*(45)* It is impractical to start from scratch in view of the large investment in existing facilities and programs: so in which direction should health care go from here?

Redirection.--There is consensus in current literature that constructive alternatives do exist, including certain promising patterns that have already been instituted in three critical areas: coordination of hospitals and related health facilities to provide comprehensive services; innovations in health manpower utilization; and national health insurance proposals. These are interdependent areas and major components of the future health care delivery system.

The proposed pattern for comprehensive service is a decentralized system, which includes a university-affiliated hospital center, community hospitals, and related health facilities, all which have an established interrelationship with defined referral patterns. The system serves a defined regional population. This concept has been advocated for from three to four decades by many of the Nation's leading health care authorities and in 1967 by the National Commission on Community Health Services. The hospital center would act as the referral center of the health services; would organize operations with satellite community facilities and a teaching hospital or medical center; and would be accountable for the health care delivered in clinics, nursing homes, home health programs or even in affiliated private physicians' offices. Decentralization of services for all but the type that requires highly technical equipment and highly specialized personnel will probably require fewer beds per capita than at present and create a relative expansion of primary health centers, group practice clinics, and home health services in more isolated areas.*(46)(47)(48)(49)(50)(51)*

This operational and planning responsibility is a burden for which most hospitals are not prepared. But the strengths of these conglomerate health care systems lie in the capacity to attract management expertise and the capacity to organize on a regional base the available supply of medical and other health talent for maximum efficiency.*(52)(53)* State and Federal governments would have roles in assisting with the funding and in establishing regulatory guidelines for the health programs.*(54)*

Diffuse and tradition-laden hospital management and administration can no longer bear the pressures without change. Policy setting for health care and its administration requires more expertise than now exists under the present system and the legal responsibilities for the quality is increasing. Thus it has been suggested that the volunteer hospital boards may give way to a new coalition of the hospital's, salaried physicians, and medical management. The hospital must have this type of primary commitment.*(55)(56)* Industrial and systems engineering have demonstrated that their techniques can also add to efficiency in hospital planning and management. Addison Bennett's article "Systems Engineering" refers to an impressive array of literature that gives examples of such efforts in cost control and manpower utilization, plus many others.*(57)* The problem of how to involve the consumer, however, persists.

The referral process is critical to the operational relationship of the facilities in the network. "Referral requires both the transfer of the patient and the necessary information about the patient from one point of care to another."(*58*) Optimal operation plans include preadmission diagnostic studies, a uniform system of recording health data, and early discharge date from hospital facilities to home or to other health facilities for followup or extended care. Computer technology makes the health data recording system a possibility. The input would come from sources such as an inpatient record, the preadmission screening records, community agencies, and doctors' offices and would be centralized for evaluation. Periodic environmental inventories and morbidity profiles could also be developed from this data system. The multiphasic diagnostic screening is economically feasible with greater volume of laboratory and other services because of reduced duplication of community services. Greater volume also makes more economical the cost of highly specialized personnel.(*59*)(*60*)

Thus, through the coordinated health services, each patient could be served from the least expensive resource, capable of providing the care required, without duplication of tests and services. Perhaps offering incentives in the financing mechanisms for optimum use of ambulatory care both before and after hospitalization can achieve this goal.(*61*)

A well designed health service system should serve all socioeconomic groups equally, but it is recognized that the magnitude of the health problem of disadvantaged groups may require special services. Several proposals are: utilizing specialty-prepared public health nurses to serve as primary medical screener therapists in isolated areas; neighborhood service centers that provide guidance, screening, and minor treatment services, etc.; and improvement in emergency room services, which is a well used source of medical care for the low income groups and those who are fearful of hospitalization. Improved housing, education, job opportunities, and preventive health measures may benefit the poor as much as curative services.(*62*)(*63*)(*64*)

Changes must also occur in health manpower utilization to keep in stride with the increased demands. Group practice has grown rapidly over the last decade. It is believed to be more efficient than solo practice and enables physicians to make better use of their skills and time. "More than 40,000 physicians now practice in approximately 8,000 groups."(*65*)(*66*) Many tasks traditionally performed by the physician are now given to technical personnel specificially trained to perform such functions. Examples of such tasks and functions are administering intravenous fluids and handling well babies and expectant mothers. New paramedical specialties have developed to share the load such as inhalation therapists, physician's assistants, and new lab workers called cytologists. Similarly, delegation of nonnursing functions to other categories of personnel is successfully being tried. Some nurses see the extended nurse role as part of the solution. In psychiatry, nurses have become involved in crisis clinics and counseling centers and some have become nurse therapists. Midwifery is showing resurgence as another nursing specialty.(*67*)(*68*)

Anne Somers believes that even with reorganization of health services to increase productivity, the number of physicians and other health personnel must be increased to improve the accessibility, quality, and economy of health care.(*69*) The numbers and categories of allied health personnel have increased year by year, all of which require appropriate educational programs and licensing requirements. In fact, projections indicate that either health services or education will soon be the Nation's largest consumer of manpower. But new categories of personnel will not help, unless they find complementary relationships and form a team rather than a hierarchy of individual entrepreneurs. The concept of team must be more than a figure of speech.(*70*)

The whole area of health education must also progress hand in hand with the reorganization of health services and must include the education of the public. While the health care consumer expects better care, he also holds a reciprocal responsibility to do more to keep himself well. Causes of morbidity and mortality such as drug and alcohol abuse, environmental pollution, obesity, accidents, and lifestyles that lead to psychosomatic and organic illness are health problems not susceptible to one-dimensional cures. Action on the part of the individual must be forthcoming to assist the health care system in solving these problems.(*71*)(*72*)

The third area of health care restructuring emanates from the health insurance proposals, many of which are in the form of legislative bills. There are a wide variety of health insurance proposals made by the AMA, AFL-CIO, leading Congressmen, the late Walter Reuther's committee for National Health Insurance, and others. Somers classified the major current proposals into three categories and then followed with specific examples of each, stated as:

(1) "A Federal program, with compulsory coverage of all or most of the civilian population, with broad and explicitly defined benefits, financed by a combination of payroll taxes and general Federal tax revenues, and administered by the Federal government without use of private carriers."

(2) "A Federal program of voluntary income-tax credits to taxpayers and vouchers to nontaxpayers, to help them purchase private health insurance, with minimal benefit standards, and financed entirely out of general revenues."

(3) "Various in-between proposals embodying some characteristics of each of the above."(*73*)

The two major proposals in category one are the Griffith's bill and the Kennedy bill, both supported by organized labor and similar in many respects. Both aim for universal coverage and provide a broad range of benefits including all necessary physicians' services and hospitalization with some limited dental coverage. Outpatient psychiatric care, private care, nursing home care, and drug coverage have more limitations in the Kennedy bill; both would be funded on a tripartite basis but differ in proportions. The administrative provisions of both are sketchy. HEW and its regional units administer the plan; private intermediaries are excluded. Kennedy's plan provides payment to the institution exclusively on an approved budget basis and to physicians on a per capita basis. Griffith's plan allows for several methods of payment.

Both plans aim to restructure the delivery system and promote comprehensive health service organizations, such as Health Maintenance Organizations (HMO's). HMO is a term applied to any "organized system of care that provides a full range of health maintenance and treatment services to an enrolled population in return for the prepayment of a fixed annual sum."(*74*) A widely recognized prototype is the Kaiser Foundation Health Plan that originated in California. It has six components, as follows: prepayment; group practice; a unified medical center including both hospital and satellite clinics; voluntary enrollment; payment of physicians and hospitals on a capitation basis (fixed fees for the time covered by contract, regardless of the amount of care provided); and coverage for the entire spectrum of care.(*75*)

AMA's Medicredit plan is an example of category two. Neither Medicare nor any other public health care program would be terminated. Each State would have a peer review organization to regulate the cost, the need for, and the quality of services. The administration is unclear. It is voluntary and completely funded out of Federal general revenues.

Category three holds all the proposals that fall between the extremes of centralization and permissiveness of categories one and two, respectively. Senator Javits' bill is a recent and well developed proposal in this group. It improves upon Medicare and extends it to the entire population. Financing would be tripartite but the Federal share is primarily for the poor and unemployed. It would be administered by the Secretary of HEW and have both private carriers and Federal plans. This plan provides grants for group practice plans and authorizes contracts with "comprehensive service systems."

The Federal Employees Program from the Aetna Insurance Company is another proposal in category three. It includes "Federal standards for private group health insurance enforced by means of reduced income tax deductions from employers in case of noncompliance; and Federal promotion of a uniform benefit plan to the poor and uninsurable by statewide 'reinsurance pools' operated like a group; underwritten by all carriers in the State; administered by a single carrier; and with statutory benefit standards."(*76*)

A set of basic requirements for an adequate health insurance system includes ideas from Anne Somers and the Task Force "Specific Issues for Investigation" in appendix B.(*77*) The list includes:

- universal coverage through some type(s) of health insurance for the complete spectrum of health care services;
- controls over quality of care that require basic standards be met prior to reimbursement;
- some form of cost regulation;(*78*) acceptability to consumers and providers;
- flexibility to meet changing supply and demand factors in the future;
- equitable financing, possible through a combination of general revenues, payroll taxes and direct patient payments;
- competitive underwriting by a limited number

of private carriers, along with Federal programs; and

- some mechanism for consumer choice to retain the individual's responsible attitude toward health care.

Each proposal can be evaluated by these criteria. However, the resolution of the plan of support will be achieved only through a coalition of forces. The solution to our health care dilemma will not come easily because it involves readjustments in human and organizational relationships. Precipitous decisions are hazardous, yet the urgency of the situation pushes for action. Change is inevitable.

Summary.—The present day delivery system is under scrutiny and some of the elements in the future design are apparent. In view of these insights, an individual proposing nurse staffing methodologies should include a variety of guidelines or models so that an appropriate one can be selected. The review of future trends also indicates that the amount and type of staffing proposed, although based upon individual clientele needs and expectations, must be reasonable in cost, be efficient in utilization of personnel, consider new emergency roles, delete others, and be effective in results. Staffing the nursing administrative leadership positions must be carefully done. These positions will require individuals highly knowledgeable about health care delivery, clinical nursing, administration, and research in nursing. There is evidence that the economy of nurse staffing is highly significant.

General Summary

The review of early nursing literature prior to 1960 indicates that there was some knowledge about nurse staffing; the subject was by no means new or unexplored. The methodology is simple, loose, and unsophisticated, with a major emphasis upon the measurement of nurse work. The problems of definition of terms, of purpose, of qualification, and of utilization are present. The issues and trends in the health delivery system give evidence of the urgency to find ways of predicting the staffing required. It also suggests the criteria by which a methodology or methodologies would be found fitting and feasible. These criteria applied to the methodology are:

- It encompasses enough pertinent variables in its application to produce valid results;
- It utilizes measurement devices that produce reliable and valid data about these variables;
- It is simple, in that it is not time consuming and can be applied by the personnel within the institution with a minimum of consultant specialized personnel in its application;
- It provides baseline data that can be used in comparative studies within the institution or within a set of similar institutions in the delivery system;
- The cost-benefit can be predicted and is worthwhile. A more costly methodology may in the long run be less expensive in terms of benefit, and;
- It is responsive to changes in the delivery system, such as the introduction of new positions or elimination of old and the creation of new supporting systems to the nursing care delivery system.

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(5) Ibid. p. 30 and pp. 134–139.

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(10) Bullough. op. cit., p. 165.

(11) Ibid. pp. 105–117.

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(51) Yaw. op. cit., pp. 88–92.

(52) Somers, Anne, R. op. cit., p. 101.

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(54) Somers, Anne. op. cit., pp. 123–124.

(55) "Experts See New Balance. . . ." op. cit., p. 40.

(56) Somers, Herman. op. cit., p. 81.

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(66) Yaw. op. cit., pp. 88–89.

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Chapter 2

The Method of Study

The history of nurse staffing, an analysis of issues and trends in health care delivery systems, and the present day concern of many individuals and groups about staffing—all point to the need to give attention to staffing methodology. An evaluation of the research, studies, and approaches focused on nurse staffing methodology in hospitals is much required. The writings appearing in the literature give the impression that they vary in publication outlet, form, emphasis, degree of sophistication, and merit. However, there has been no prior systematic examination of them for the purposes of pulling together our knowledge about nurse staffing or for looking at what they may contribute to resolution of the problem of staffing.

Primary Aim and Major Objectives

The primary aim of the project was to screen, review, and critique relevant research, studies, and approaches focused on measuring nursing care needs in hospitals. Six major objectives evolved from the aim of the project. These were:

1. To develop a glossary of terms, including definitions, for use in the review of the literature relative to nurse staffing methodology.
2. To identify the research, studies, and approaches bearing upon the subject and to review, critique, and summarize them, giving recommendations, and noting in content of each review the following:
   - the theoretical framework of the investigation;
   - the aspects pertinent to the measurement of nursing care requirements and the prediction of nursing staff needed;
   - the relevance of the various research and designs to the overall problems associated with nurse staffing;
   - the specific innovative approaches and adaptations used;
   - the characteristics of the study and the variables most significant in the findings;
   - the measurement devices that could be readily translated into present day use; and
   - the contribution the study makes to knowledge about the subject.
3. To describe the various methodologies used in nurse staffing research and to compare them on such features as:
   - the rationale underlying each approach;
   - the reliability, validity, and reproducibility of the tools and instruments;
   - the effectiveness and economy of the method;
   - the type of setting required for the application of the methodology; and
   - the personnel requirements for application of the methodology.
4. To design suitable worksheets to facilitate the identification of pertinent and relevant research and other approaches on the subject and to establish a pattern by means of which they can be assessed and critiqued in terms of relevance.

5. To prepare a summary statement about the literature received and the site visits incorporating the following:
    - the variables and baseline data essential for practical implementations of staffing methodologies in hospitals;
    - the problems and issues involved in the construction of nurse staffing methodologies;
    - the limitations and strengths of existing methodologies and statements made by other researchers on this question;
    - the necessity for modification in methodologies because of variables associated with the setting, the characteristics of the institution, the personnel, and the patients;
    - new models of or guidelines for staffing methodologies; and
    - hypotheses for future testing.
6. To incorporate this in a final comprehensive report that includes a compilation of the exhibit materials and various bibliographic materials.

Method, Worksheets, and Procedures

The method employed to assess the literature on nurse staffing approaches drew heavily upon survey techniques, involving a literature search for primary source materials and a review and critique of writings obtained. In the early stage of planning the project, it became apparent to the research staff that agreement must be reached upon specific definitions. One of the immediate concerns upon the initiation of the project centered upon the literature search. Problems encountered related to the question of which publications were relevant to the question of nurse staffing methodology and which were not appropriate. The problem of containment persisted throughout the project. However, it was decided by the staff that the definition of relevance was "bearing upon or pertinent to." Therefore, it was decided that to be relevant to the project the piece of literature must deal specifically with one or more of the following topics:

- measurement of patient care requirements,
- measurement of nursing activity,
- prediction of requirements of nursing staff, or
- indirectly related to patient welfare, nursing personnel welfare, or to the work of nurses.

The Literature Search

The literature was searched with this definition of relevance in mind. A variety of sources were tapped to uncover articles, books, reports, research studies, and other forms of writings. The search was systematically conducted and included:

1. *Dissertation Abstracts International*, for the years 1960 to the present.
2. Simmons, Leo W., and Henderson, Virginia. *Nursing Research: A Survey and Assessment*. New York. Appleton-Century Crofts, 1964.
3. The index and abstracts listings in *Nursing Research*, in all issues from Volume 1, 1955, to the present.
4. U.S. Department of Health, Education, and Welfare, Public Health Service. *Research in Nursing: 1955–1968*. Public Health Service Publication No. 1356, Revised 1969.
5. *Abstracts of Hospital Management*,[1] 1968, 1969, and 1970.
6. Listing of studies performed by the Community Systems Foundation and obtained through correspondence with them.
7. *Occupational Research*—abstracts of Iowa research in Health Occupations Education, 1960–68, provided by Elizabeth Kerr.
8. Bibliography prepared by MEDLARS in response to a request from Dr. Lillian M. Pierce, Ohio State University. This search covered two periods: January 1964-December 1966 and January 1967-January 1970, inclusive. The listing was made available through the courtesy of Marie R. Kennedy, Nurse Consultant, Division of Nursing, National Institutes of Health. A total of 364 citations were identified in the search.

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[1] Special assistance was provided by Dr. Roger Amidon. He was very helpful in suggesting sources and specific studies.

The MEDLARS search sought to locate articles under the subject headings of Patient Classification, Nursing Care Standards and Manpower, and Nursing Personnel Administration. In addition, eight subheadings were searched in both periods: Hospital Nursing Service, Hospital Nursing Staff, Patient Care Team, Hospital Personnel Administration, Personnel Management, Systems Analysis, Patients, and Classification. In the earlier period, Nursing, Human Engineering, and Evaluation Studies were also included as subheadings, whereas in the latter period, Patient Care Planning, Hospital Personnel, Quality of Health Care, Nursing Audit, and the specific subheadings of Utilization, Manpower, and Standards were added.

9. Reference listings used by graduate students and for personal use by the following individuals:
   - Eva Erickson, Associate Professor, College of Nursing, University of Iowa.
   - Doris Miller, Assistant Dean, University of California.
   - Dr. Marjorie A. Moore, Associate Director, University of Iowa Hospitals.
   - Virginia Walker, Director of Nursing Service, Southwest General Hospital.
10. Listings of theses and field studies provided by the following Directors of the Graduate Programs:
    - Edna Grexton, University of New York at Buffalo.
    - Maureen Maxwell, Loma Linda University.
    - Grace Peterson, DePaul University.
    - Marilyn Willman, University of Texas.
11. Current serials listing of reference materials under headings similar to those in the MEDLARS search available at the University of Iowa Libraries.
12. *Health Services Research*, all volumes.
13. *Alumni Roster*, Graduate Program in Hospital and Health Administration, the University of Iowa, 1968–69.

In addition to this formal search, correspondence was directed to individuals who were named in the listing of *Current Nursing Research Grants Supported by the Division of Nursing: January 1969*,(*1*) asking for either a copy of their research report or a progress report. All directors of graduate programs in nursing service administration were contacted in writing to learn if they had any knowledge of studies related to nurse staffing. Each report or article, as it was reviewed, was scanned to obtain references that were suggested. These were followed up either through literature search or through correspondence.

The total number of articles, studies, or pieces of literature that came to the attention of the research staff, through one source or another, is 1,026. Of these, many by title alone were judged inappropriate. Thirty-six were reviewed and later judged not appropriate. A total of 182 met the criteria of relevance and were reviewed and critiqued.

For the review and critique of the literature, specific definitions were established.

> *Research Review:* "a general descriptive account of a research study in which the reviewer identifies and summarizes the major features and characteristics of the study."(*2*)
>
> *Research Critique:* "a critical estimate of a piece of research which has been carefully and systematically studied by a critic who has used specific criteria to appraise the favorable, less favorable, and other general features of the research study . . . however, the central focus is upon a critical appraisal or estimate of the study, rather than a descriptive account of what is in the study."(*3*)

The worksheets: purpose and development.—Three worksheets were developed by the research staff to facilitate accomplishing their tasks. The first went through three revisions before it was satisfactory to the staff; the second, four; and the third, two. As the review of the literature proceeded a related problem was identified, that of vocabulary use. To facilitate understanding of the terminology used in the project, the staff developed a *glossary of terms* (section II).

A *worksheet for the review* was used to provide the reader with a picture of the content of the literature piece so he could decide whether or not to read the study in full. The worksheet included identifying information, such as the name of the author and biographical data about him, the title of the literature, its source or publisher, the source of funding, if given, and the local source where it could be obtained. The content of the item was summarized on the worksheet (appendix A).

The *critique summary* worksheet included the same identifying information. Instead of the content of the piece, this worksheet dealt with the relevance and design of the problem and methodology, specific innovations and adaptations from other methodologies, the analysis and its interpretation, the significance of the report, the significant variables, the value of the tools and instruments, and the contribution and impact of the study (appendix B).

A *summary worksheet* was used to present a general picture of the writing as to its relevance to nurse staffing, the variables considered, the nature of the study, and its feasibility of application to staffing methodology in hospitals. It was used in the comparative analyses of the literature (appendix C).

The Procedure

The procedure for the study was consistent. It consisted of these steps:

1. Identification of the piece of writing, through any of the sources named above.
2. A cursory review of the writing to ascertain if it met the criterion of relevance and if it were the primary source document. If it were not the latter, correspondence was initiated in an effort to obtain the basic document. Sometimes the correspondence was directed to the investigator or author. At other times it was possible, through a reference in writing such as an article in a periodical, to secure the basic study from a library, a foundation, or a corporation.
3. If the writing were not relevant, it was noted "not appropriate."
4. Relevant writings were read and the review written by one of the research staff.
5. Following the review, the principal investigator read the study and its review, made changes if necessary, and completed the critique and the summary form.
6. A description of a specific methodology was drafted by the investigator.
7. From these three completed forms, the writings on problems, issues and recommendations emerged.
8. The literature search was then summarized to give:
    - a listing of all articles coming to the attention of the research staff. These articles were from many sources.
    - identification of publications that were relevant and therefore were reviewed, critiqued, and summarized.
    - identification of publications that were secondary source materials, reflecting an impact or dissemination of primary source materials.

Organization of Staff and Timetable for the Project

The staff consisted of the investigator, two research part-time associates, and a secretary. Throughout the project, additional research and clerical assistance was obtained. The staff worked closely together utilizing the specific protocol and procedures set to accomplish the tasks. The qualifications of the staff are given in appendix D.

During the first quarter of work on the project, a systematic and feasible timetable was established for the accomplishment of the objectives. The timetable consisted of four phases. Distinct tasks to be undertaken and dates for their completion were set for each phase. The plan was as follows:

First phase:

(a) Organization of the project staff.
(b) Establishment of limits of the research.
(c) Design of mechanisms necessary for the literature search, review and critiques.
(d) Initiation of literature search.
(e) Conduct of correspondence with other investigators.

Second phase:

(a) Development of glossary of terms and definitions.

(b) Design of worksheets for Review, Summary, and Critique.

(c) Organization of materials to facilitate the search and to facilitate cross checking of studies.

(d) Refinement of literature search.

(e) Review and study of materials (continued).

(f) Continuation of correspondence with investigators regarding studies.

Third phase:

(a) Redesign of worksheets for Review, Summary, and Critique.

(b) Preparation and test of Summary Worksheet for the Comparative Analysis of Methodologies.

(c) Preparation of statements about Individual Methodologies.

(d) Identification of Project Site Visits required and arrangement of a design instrument (for use in the future) for identifying relevant research and means of assessing it.

(e) Writing of drafts of sections of final report.

Fourth phase:

(a) Completion of literature review and conduct of final site visits.

(b) Completion of summary statement.

(c) Completion of lists of materials reviewed; those reviewed and critiqued and assembled in suitable form, all materials for exhibits.

(d) Completion of final report.

(e) Closure of correspondence with other investigators.

References

(1) U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health. *Current Nursing Research Grants Supported by the Division of Nursing: January 1969.* Public Health Service Publication No. 1762.

(2) Leininger, Madeline M. "The Research Critique: Nature, Function, and Art," *Communicating Nursing Research,* NU 00289–01, ed. by Marjorie Batey (Boulder, Colorado: Western Interstate Commission for Higher Education, July 1968), 20.

(3) *Ibid.* 20–21.

Chapter 3

Generalizations About Findings in the Literature

The search for literature relevant to nurse staffing methodology was conducted systematically. The problem of how to obtain a particular piece was often puzzling. However, through persistent searching and the assistance of several individuals, the document was eventually found. In all, 182 pieces were reviewed, critiqued, and included in the study. Of these, 77 were classified as books, monographs, and research reports. Thirty-one were reports and term papers. Twenty-six were classified as manuals, pamphlets, and guides, and 48 were found in the periodical literature. The decision not to prolong the literature review was a difficult one because the titles of the unexplored items in the bibliography were tempting. The review was not carried further because of lack of time. The literature that was reviewed, including the 36 pieces of literature considered inappropriate, represents approximately 20 percent of the bibliographic listing. Not used in the calculation were the references, glossary, books, periodicals, and reports cited in chapters 1 and 2 of this report, and others referred to us that were obviously textbook and reference materials.

The variation in the type of literature reviewed makes a general summation of the analysis difficult. The pieces of literature were diverse in many respects. They vary in the purpose for which they were written, in publication outlet, in the detail of documentation of content, and greatly in scholarliness as defined by organization of content, nature of source materials, application of logic, style of writing, and presentation of new knowledge. The audience to which the literature is directed is comprised of individuals associated with the health field. There is no dearth of literature on the general subject of nurse staffing. But there is a great absence of tightly conceived, well-structured explorations of nurse staffing experiments. There are a few comprehensive well-designed research studies directed toward examining a specific staffing model and its impact on patient care and cost.

To bring together the findings in this review, chapters 3 and 4 have been organized around topics that are presented in a specific sequence. First, information is given relating to the measurement of nursing work, patient classification systems, and the variables impinging upon nurse staffing. Chapter 4 examines methods currently being applied in hospitals today to predict the nurse staffing requirements, to establish patterns of staffing, and to control the utilization of nursing personnel.

Consequently, chapter 3 is organized into five sections. The first describes general characteristics of the literature reviewed. The second presents an analysis of the methods used to measure nursing work. The third features characteristics and approaches in the patient classification systems. The fourth summarizes the literature written on criteria of patient care, efforts to identify and measure quality of care, and programs of quality control. Section five brings together the review of the writings concerned with the many variables influencing the practice of nursing and the attempts to deliver care to patients. Chapter 4 analyzes and compares the various approaches to nurse staffing methodology. A final summary section concludes the chapter.

General Characteristics of the Literature

The analysis of characteristics of the literature was made with selected parameters in mind. These parameters are eight:

- conceptualization of the problem or topic reflected in the content of the piece of writing,
- degree of logic applied to the problem,
- selection of variables for treatment,
- means by which they were defined,
- degree of elaboration of content,
- sophistication of analysis,
- style and quality of writing, and
- format in which the literature appears.

The majority of the pieces of literature reviewed are poor in quality, a subjective measurement to be sure but made with the specified parameters as a basis of appraisal. Many of the pieces fail to give a thoughtful, well-structured presentation of a problem and its analysis. Literature reviews or references are almost totally absent when their presence is expected as a natural development of the problem. Theoretical framework, or some basis for rationale, is absent in many studies and reports where one would logically expect it. If one were to judge from the lack of acknowledgments and what appears to be borrowings from other researchers or authors, he must conclude that some explorations of topics either occurred concurrently or in isolation. Impact of a specific piece of work was almost impossible to determine and linkage between investigative or descriptive efforts of more than one individual could not be identified for many writing on the same topic or closely related subjects.

The number of variables selected for treatment ranged from a few to hundreds. The variables can be classified into three major groupings: the academic discipline from which they originated, the purpose they serve, or the source of the variable itself. General categories of the variables and examples are as follows:

Categories of variables based on source of variable:
  Patient-centered
  Unit-centered
Categories of variables based on academic discipline:
  Sociological
  Physiological
  Nursing
  Economic
  Psychological
  Engineering
  Architectural
Categories of variables based on purpose they serve:
  Supportive
  Curative
  Rehabilitative

Many of the variables appear to cross into more than one category, and they are arbitrarily placed into specific categories. The decision as to classification is based upon an interpretation of the meaning given in the operational definition.

The variables also provide a scheme of the nursing care delivery system and the forces bearing upon it. Nursing practice evolves from the requirements presented by the patient (figure 1).

The nursing service provided in a nursing unit depends upon factors other than the nursing care requirements of the patient. It depends, in large part, upon the purpose of the unit, the medical and nursing programs of care, the supporting services made available to the nursing unit, the layout of the unit, and the competency of the nursing staff. The scheme of the total nursing care delivery system includes forces affecting it from two other sources: the environment external to the hospital

Figure 1. Scheme of relationship between patient state and nursing practice.

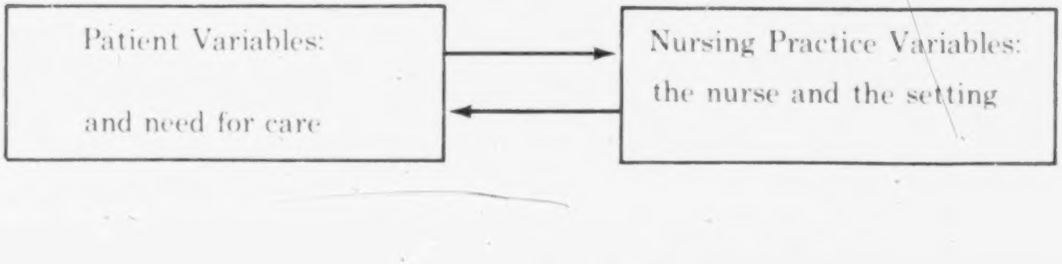

Figure 2. Scheme of nursing care delivery system and forces affecting it

Community Environment

- Clientele:
  - Expectation of services
  - Knowledge of medical-hospital system
  - Health knowledge and utilization
- Financial resources of community
- Physician supply and expectation
- Nursing manpower supply

Hospital Environment

- Physician
  - organization
  - individual differences
  - attitudes and expectations
- Patient utilization of services--occupancy rates and admission, discharge patterns
- Specialization effort: complexity, intensity, and variety
- Floor layout: types and size of units
- Budget and budget control
- Hospital administration
  - organization
  - management style
  - leadership
- Assignment of supporting services: accessibility, condition, adequacy, and individuality of items
- Hospital policies, care programs
- Organization tension and authority structure
- Intent and purpose, philosophy, objectives

Nursing Administration

- Status of nursing and nurses in the total structure
- Leadership and management style
- Perception of purpose: philosophy, objectives
- Policies and programs: development and execution
- Authority structure--decentralization, decision making, delegation
- Communication
- Coordination
- Budget and budget control

Nursing Unit

- Nursing supervision: clinical knowledge and skill management and training
- Amount, type, and kind of nursing staff and their combination in work
- Employment status of staff
- Absenteeism, turnover, propensity of staff to leave, illness
- Personnel policies: salary
- Inservice and staff development programs
- Allocation and assignment of staff
- Education and experience of staff
- Role clarity, role definition, and expectations of staff
- Knowledge and skill of staff
- Affective states of staff: satisfaction, morale, overload, tension, sense of achievement

and the hospital environment itself, including the systems other than nursing (figure 2).

A staffing program takes into account indirectly many of these forces since they appear in the major elements of the program. The elements of a staffing program are five:

(a) quality of patient care to be delivered and its measurement;
(b) characteristics of the patients and their care requirements;
(c) prediction of the supply of nurse power required for (a) and (b);
(d) logistics of the staffing program pattern and its control; and
(e) evaluation of the quality of care desired, thereby measuring the success of the staffing itself.

Each piece of literature was in some way related to one or more of the variables appearing in these schemes.

The expliciness with which variables are operationally defined varies in the studies. The terms used to describe many variables are markedly deficient, since the terms fail to convey the essential qualities or the precise meaning of the variables. On the other hand, some authors are exact and thorough in the development of the operational definition of the variables. Data about variables are collected through a variety of methods: checklist, interview schedule, questionnaire, interview, observation, log, diary, and other standard methods. The major share of data collection instruments and tools have not been submitted to rigorous field testing. Many have not been submitted to testing for reliability of data collection, for face validity, for construct validity, for sensitivity, or for consistency. On the other hand, a few studies are exemplary in the meticulous development of tools and instruments.

The sophistication of the analysis appears to be related to the background of the author, the purpose of the writing, the nature of the problem, and factors that are provincial in nature. For example, a number of the reports appearing in section II B *Reports* and *Term Papers* are not as sophisticated in the analysis as are some of the research reports. This difference is to be expected because the question under study is directed toward a decision required in a specific institution. The search is frequently termed "problemistic." A number of writings in section II B are papers written in graduate courses and the data collected require a very simple analysis. However, errors are frequently made as to whether the statistic selected is appropriate to the type of data. In the research reports, only a few state the assumptions underlying the selection of a particular statistic and present evidence that these assumptions are met.

The style and quality of writing vary. A few studies could serve as models; the writing is clear, edited, and logically organized. The level of sophistication in the writing reflects the author's understanding of the audience to which he directs his writing and, in some cases, his understanding of the editorial policy of the journal in which it appears. The disappointing feature about so much of the literature is the lack of precise wording, the ambiguity of the statements, and the absence of a logical development of the ideas as they appear in the content. This criticism, however, must be somewhat softened by the knowledge that some of the literature was written for purposes other than communicating with a reader. Some pieces were unquestionably written as exhibits for an oral report.

The format of the literature varies from unpublished papers to books. Because of the many forms in which the literature was found, definitions were written to classify the literature. The bibliography is lengthy and serves to direct the reader to additional sources.

Study of the literature leaves the reader with the impression that the amount is vast, highly uneven in quality, and available through many outlets. Of great concern is the quality of the reporting itself. The value that can be placed upon the content of the piece is often limited. The value of what is written is often questionable. The writing lacks sufficient detail to have meaning for the reader.

Measurement of Nursing Activity

In the literature reviewed, the measurement of nursing work basic to staffing predictions was achieved by applying the techniques of work measurement drawn from engineering. Although extremely difficult to read because of the author's style of writing and the use of engineering terminology. Hudson's early study (A26, Hudson)[1] is an excellent example of specific applications of the various engineering techniques to the study of nursing and the problems associated with it. The investigator presents criteria that supports the classification of nursing work as nonrepetitive work. He also examined questions relating to variations in task prediction time, to procedure development, and to the incentive problem. Hudson found it difficult to encourage individuals to complete task assignments within the time predicted for their accomplishment. He concluded that task time variation was due not only to the individuality of the patient and his condition but also to the individuality of the nurse, her concept of nursing practice, and her preconceived notion of how to perform it. Adherence to a preset plan or procedure was not seen by nursing personnel as either essential or desirable. The work sequence and pace were set by other kinds of priorities.

Feyerherm (A15, Feyerherm) confirmed some of these problems of applying engineering techniques of work measurement to nursing. He stated that he had difficulty in two areas: the precise definitions of a specific unit of work and the variables influencing time to perform tasks, which include not only the amount of work but also the number of personnel to do it.

Four techniques are drawn from engineering to measure the work of nurses; all of these involve the concept of time required for performance. Differences in techniques reside in how data are collected, how they are categorized, how amounts of time are estimated, and how minutely nursing work is described. The four techniques are:

- time study and task frequency,
- work sampling of nurse activity,
- continuous observation of nurses performing activities, and
- self-report of nurse activity.

Time Study and Task Frequency

The first of these, time study and task frequency, consists of the analysis of nursing work into specific tasks and task elements. A decision is made as to the points at which a task (procedure) begins and ends. Individuals are then timed as they perform the task (procedures). The total number of timings (sampling) depends upon the degree of confidence one wishes to place in the average time obtained for the task (procedure). An allowance is made for fatigue, personal variation, and unavoidable standby. The average time plus the allowed time gives a *standard time* for the procedure (task). The measurement of nursing activity is made by multiplying the *frequency of task* by *standard time*. The total of all tasks multiplied by standard time equals volume of nursing work. The basic documentation in staffing approaches using this technique included a manual of hundreds of "standard procedures" and a "standard time for each." The frequency of task performance is usually obtained by a checklist with the individual reporting his performing the task, his skill level (defined by position classification), and the place of performance.

Only a few pieces of the literature described the basic study of tasks to establish standard times, although predetermined standard time was used by many (table 1). *The Nursing Procedure Manual* (C3, CASH) used by CASH was designed to provide a basis for checking the time standard for each procedure. It was derived by direct observation using engineering techniques. An allowance of 20 percent is made for personal time. Although the manual explains how these time standards were obtained, there is no basic documentation of the findings themselves. In the *Study of Nursing Time Requirements for Patients of Various Age Groups, 1966*, CASH (B5, CASH) reported that time recordings of selected care procedures were made by nurses. Eighty-nine procedures, of which 26 were considered basic and constant and 63 were varied depending upon special requirements, were not described except in general terms. The sample of observations was not included in the report. Neither were the statements of the nursing procedures, their descriptions, the method of time study, the selection and training of observers, and the tests for observer reliability or error in measurement.

Madden (B22, Madden) timed procedures in an attempt to determine the staffing requirements for

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[1] The references in parentheses in chapters 3 and 4 refer to the reviews and critiques in section II. The coding A refers to BOOKS, MONOGRAPHS, and RESEARCH REPORTS; B refers to REPORTS and TERM PAPERS; C to MANUALS, PAMPHLETS, and GUIDES; and D to PERIODICAL LITERATURE. The code and the number of the piece is given, as well as the author's name. If the author contributed more than one piece of writing reported in that part of section II, an abbreviated title is added.

Table 1.--Authors and investigators using standard procedures/standard time in measuring nursing activity

Reference no.	Author or investigator	Literature	No. of procedures	Comments
(C3)	CASH	*Nursing Procedure Manual*	138	listed in manual with standard time
(C4)	CASH	*Staff Utilization and Control Program Orientation* Report Medical/Surgical	26 63	basic special
(C5)	CSF	*Nurse Utilization Study: Standard Data Approach*	—	uses CASH's list and standard time
(C9)	HMEP	Nursing Unit Quality Index Plan	—	uses CASH's list and standard time
(C12)	Mass. Hospital Assn.	*Staff Utilization and Control Program for Nursing Service*	—	uses CASH's list and standard time
(C15)	Rueckert	"A Brief Review of Facts Formula Analysis and Control Technique for Staffing.	—	developed own pattern after CASH but does not give number
(C17)	SCALE	*Nurse Staffing Program*	—	uses CASH's
(B18)	Ludwig	"Establishing Staffing Criteria for Evaluation of Nursing Service Functions--A Management Engineering Contribution"	13	basic tasks
(B19)	Ludwig	*Results of the Nurse Utilization and Staffing Control Methodology for DeGraff Memorial Hospital*	97	special tasks, DeGraff Hospital
(B20)	Ludwig and Sanders	*Nurse Utilization and Staffing Control Methodology*	25 116	basic tasks special nursing tasks
(B22)	Madden	"A Study of Staffing Needs on Long-Term Wards at Rancho Los Amigos Hospital"	—	not given
(B23)	Moriconi	"A Study on Patient Categorization and Nurse Utilization"	89	standard time set by CASH
(B25)	Schick and Wilczynski	*Nurse Utilization Study*	80	called basic tasks
(B30)	Wase, Feurer, Pyle	*A Nurse Utilization Program*	24 145	basic care procedures special care procedures
(D20)	Hansen	"How to Measure Nursing Care Time"	—	not given (similar to CASH's)
(D21)	Harris	"Staffing Elements"	—	not given (follows CASH's plan)
(D30)	McCartney, McKee, Cady	"Nurse Staffing Systems"	—	not given (similar to CASH's)

chronically ill patients. The sample was not reported and the method only briefly described.

There is sufficient evidence to indicate that this method (time study and task frequency) is acceptable to many individuals struggling with the question of nurse staffing prediction. Few authors suggested a standard reference on time studies. Perhaps, since these techniques have been widely used, such references are no longer viewed as necessary.

In a sense, the other three engineering techniques measuring nursing are variations of task frequency and time. Nursing tasks are lumped with activities. Nursing activities are then classified into major or minor subcategories. The classification of categories is usually along three dimensions: • the relatedness of the patient to the activity, • the nature of the skill involved in the activity itself, and • the therapeutic purpose of the activity. Examples of these are exemplified in the use of such words as: patient-centered activity, direct care, communications, clerical, unit-centered, therapeutic, feeding, and toileting. In the various approaches, reports, and research studies reviewed, a variety of categories were used. An individual must be very attentive as he reads reports since the operational definitions used for categorizing activities differ from one study to another. The differences in category descriptions make comparisons either impossible or highly questionable.

Work Sampling

The work sampling technique is a standard method for the study of work and was reported more often than any of the other three techniques. In this technique, nursing work is identified by major and minor categories of nursing activities. Through random sampling of nursing personnel as they perform their work, observers obtain observations of nursing personnel performing various activities. The total number of observations divided by the frequency occurring in a specific category yields the percent of total time (during which observations were collected) spent in the performance of that activity. The total number of observations to be made is determined in advance and is based upon the amount of sampling required for confidence in the data sampled.

Twenty-five authors or investigators made use of this technique in their studies. The number of major categories ranged from three to 16 (see addendum).

The application of work sampling was made in studies of nursing single units and in many hospitals with many units. Many used a computer for processing the data. Jacobs, Patchin, and Anderson (A33, Jacobs, Patchin, & Anderson) made use of the U.S. Public Health Service (USPHS), Division of Nursing, method of working sampling in a large study involving 52 hospitals, 154 nursing units. Likewise, Robinson (A56, Robinson) used work sampling in a study of one hospital nursing service reducing nine major categories to four for the final analysis. Robinson pointed out that the major problem in the use of a standard computer program was the time required for coding and recommended a document reader to reduce this difficulty. McKenna (A43, McKenna) used work sampling in his study of the impact of unit management on nursing activity and patient welfare. The nine categories in his scheme were pointed up to discriminate between differences in management functions between the experimental and the control units.

The categories occurring most frequently in the literature are *direct care* and *indirect care*, indicating that most of the individuals studying the problem of utilization were interested in the amount of time spent by the nursing personnel with the patient in direct care as opposed to the time away from the patient. In fact, MacDonell, Brown, and Johannson (A45, MacDonell, Brown, & Johannson) on page 77 propose to define efficiency as the ratio of:

$$\frac{\text{time spent in direct nursing care}}{\text{time spent in indirect nursing care.}}$$

Continuous Sampling

Continuous sampling follows the same general pattern of categorization except that an observer follows or accompanies one individual in the performance of a task. He may also observe the nursing work performed for one patient or for more if they are in the same room or if they can be observed concurrently. This was the technique used by many of the Johns Hopkins Operations Group. The total number of observations for confidence (in the data sampled) is estimated as in work sampling.

MacDonell, Brown, and Johannson (A45, MacDonell, Brown, & Johannson) conducted time studies of procedures related to severity of the patient's case, using a three-scale classification of severity of the patient's illness. His approach and patient classification scale drew upon that developed by Connor and others. As a tool in classification of patients, MacDonell used a form for care assessment called a "proforma," a checklist of nursing activities, and scored it by giving a point value to each response on the list. After the selection of the patient by the class, the patient was observed as he received care from nursing personnel. The practice for timing of procedures was well developed. Two observers in 6-hour shifts carried out the timing. Previous practice in observation by the two reduced the variation in their recorded results. Time was determined for *direct care*, defined as administering time and nurse-patient interaction, and *indirect care*, defined as time required for assembling and preparing for the procedure. They found that the time required for 11 procedures, when compared, revealed differences between levels (severity of the case) that followed no consistent pattern, indicating that generalizations could not be made about the amount of time for specific procedures.

The great value of MacDonell's study, other than its being an example of continuous time study of procedures, lies in its identification of factors that have a bearing on time used. The authors state that amount of direct time required for performance is affected by hospital policy, work assignments, familiarity of nurse with procedure, anatomical and clinical status of the patient, and the degree of communication established in the nurse-patient interaction. Time for indirect care used in procedures is determined by the accessibility, the quality, the individuality, and the condition of supplies, equipment, and patient care items.

Repp (A55, Repp) continuously observed head nurses perform their work. Although her study is limited, it makes a contribution in that criteria for the beginning of a new task are proposed: (a) responding to a different person, (b) changing physical activity, and (c) changing purpose of the physical activity. She also points out the variables that contribute to variation when tasks are grouped into larger functions, variables that are frequently ignored in grosser classifications.

Self-Reporting

The self-reporting method is used for both the task frequency multiplied by standard time technique and for the technique leading to categorization of work. In self-reporting, the individual checks a predetermined list or logs in diary form the tasks he has performed. The entries in the diary or log may be made at time intervals or may be made at the close of a major category of work or a specific task assignment. The self-reports are analyzed by sorting the entries into categories or classes of tasks similar to those for work sampling or by the development of themes or problems describing the activity. The decisions concerning the frequency of diary entries, the analysis of the content of the diary and its breakdown into percent of time depends upon the purpose of the study and the rationale for the data collection.

An example of the use of self-reporting appears in the literature in Levine's comprehensive study (A40, Levine). Directors of nursing kept detailed reports of their work. These reports were then analyzed to determine the percentage of time spent on interpersonal contact activities, the percentage of time spent on the administrative processes, the average duration of time spent in interpersonal contacts, and the time spent on content of the various administrative processes. In a study at a VA Hospital, Iowa City, Iowa, (B29, Veterans Administration Hospital) personnel recorded at 5-minute intervals activities in which they had just been engaged. These entries were then coded and classified into eight groupings of nursing activities. A system has been built in for auditing recording procedures to minimize errors of reporting work tasks.

Cazin's study (A10, Cazin) represents another means of self-reporting that is sometimes used in measuring work. In ascertaining whether or not there is a difference in types of activities performed in small hospitals and in institutions, she used a questionnaire that provided a four-point scale for rating the frequency with which activities were performed: "always," "often," "seldom," or "never." This type of instrument is unsatisfactory. The ambiguity of meaning of the terms reflecting frequency is obvious. The data obtained are imprecise and gross.

Summary

The measurement of nursing activity in the approaches, reports, and research studies reviewed varies greatly in precision. Two major deficiencies are apparent in the application of these techniques to the measurement of nursing. There is no question about the feasibility of the techniques. The techniques themselves are sound. They are well tested; they can produce reliable data if properly used. The concern centers upon the appropriateness of their use to the study of nursing practice, the logic underlying the use of the techniques, and the precision with which they are applied.

First, the conceptualization of nursing practice derived from use of these work measurement techniques is limited in scope and character. Nursing work is seen as procedural in character. It is task-oriented with specific beginnings and endings. The measurement does not reflect the sweep of the effort. Neither does the measurement convey the sense of great complexity inherent in practice. Their application measures nursing as it is currently practiced in hospitals that may well be characterized by interruption and discontinuity. Although the nursing units selected may be the ones whose staffs are seen as providing the best care in the hospital, questions can be raised as to whether the nursing practice observed is the most effective that *can* be provided. In none of the literature reviewed were there models of the nursing practice to be achieved as optimum under the circumstances. The descriptions of nursing activities obtained by the measures applied reflected the *status quo*. They included the repetitious care, the ritualism, and the unnecessary, ineffective acts. Omissions were not identified. The problem of designing a model of nursing, meeting desired yet feasible criteria, is the major one in nurse staffing research. The problems of its construction are many. Unfortunately, nursing practitioners and nursing administrators have not given attention to this basic problem and are unable to identify realistic and feasible criteria. They are unable to articulate their concerns about the lack of standard models. They are unable to give guidance to individuals sincerely interested in helping them in staffing methodology.

Second, the data collection tools, the procedures, and the reliability with which these are carried out are markedly lacking in objectivity, reliability, and accuracy. Only a few of the studies describe the pretest of forms and data collection worksheets. Several mention orientation and training of nursing staff and observers. The number testing observers for agreement or rater reliability are few. The errors in recording or reporting data are seriously ignored in most studies. Few make any reference to the accuracy of reporting. Often sample size and sampling procedures are not given. Consequently, the reliability of data presented in nursing activity measurement is suspected as being biased and incomplete.

Patient Classification Schemes

Conceptually speaking, nursing practice and its delivery evolve from the patient population that the staff serves. The type of nursing practice, the amount, and the time of its delivery are derived from the requirements of patients. The introduction of the categorization of patients is an attempt to quantify the workload created by patient care demands. Forty-one pieces of the literature referred to a classification scheme (see addendum).

Although some early references (D10, Claussen) (A61, Smith) were made to patient classification, the first major effort to group patients into classes by some logical and feasible scheme applicable to medical-surgical patients was made by the Johns Hopkins Operations Group. This group has provided the major leadership in the classification studies. Connor's work, a classic, has been modified by various individuals but it serves as the model for the work of others who followed. The writings of Connor, Flagle, Preston, and White have made a great impact on research studies and nurse staffing methodology throughout the United States.

The variables selected by Connor (A11, Connor) for use at the beginning of his exploration of a scheme are not the usual variables of census, medical diagnosis, specialty, and age. He began his scheme drawing upon factors associated with nursing problems of mobility, consciousness, disturbance, inadequate vision, and isolation. From preliminary observation of patients presenting these problems, he developed the patient classification based on direct patient care elements. Connor's research also included trial of the classification scheme on nursing units. As evidence of its feasibility, he presents the distribution of patients in classes and statistical evidence. This work, though meticulously carried out and based on a sound theoretical framework, has limitations. Although he consulted nursing personnel throughout the study, it is unfortunate that he began the research with nursing problems relatively limited in scope and complexity, although unquestionably present. The problems are primarily pathophysiological in nature. How representative they are of the problems with which nurses must deal and how they are distributed in a population of patients are open to question. The research has limitations in the operational definitions presented in original sampling and in reliability of data. For example, the development and testing of forms for recording data on which his classification was based are not described. There is no report of the agreement among recorders of data collection based on observations. No report is given of a test to learn if the nursing staffs were consistent in the reporting of data or if the individuals reported complete data. Hourly variation of change in patient classification or morning-evening variation was ignored in the study, or at least not reported.

Connor also proposed the Patient Load Index, an estimate of workload, which is derived by multiplying the number of patients present on the nursing unit in each class by average time for that class and totaling it. The average time for each class was determined by timing the direct care given by the staff to a sample of patients in each class. There is evidence of wide variations in the amounts given and much overlap. Statistically, there is support that the classes differ. However, the broad overlap also suggests that the original definitions may not be as tight as desired.

Connor's ideas, carefully and thoughtfully implemented, have merit in a staffing methodology. He has prepared a classification scheme based on elements of physical care, accepting nursing practice as he found it. From these classifications he built the Patient Load Index and a Controlled Variable Staffing Plan.

Few studies or writings were found that challenged or questioned Connor's and Flagle's work. Levine (A40, Levine) tested Connor's scheme for reliability and obtained a rating of .92, of which 1.0 represents perfect agreement.

White, Quade, and White (A71, White, Quade, & White) identified the problem of lack of agreement on patient classification between physicians and nurses, especially in the self-care and immediate care classifications. Their study *Patient Care Classifications: Methods and Applications* is an attempt to examine degree of agreement between the two professional groups and to improve the criteria. The authors concluded that lack of agreement does exist. They proposed rules to reduce the lack and the use of specific and fewer criteria on which there is higher agreement. These three made the assumption that physician agreement was correct, an assumption that may be challenged. On the other hand, if control of the placement of the patient is fully under the physician's authority and this is the question under study, the assumption is correct. Unfortunately, White, Quade, and White do not report inter-nurse agreement or inter-physician agreement. The findings indicate "that the evaluation tools are consistently misclassifying too large a group or approximately one-third of the total sample" (p. 16). The measure of reliability (the proportion of patient days on which there is agreement) is .67 for one group (1,163 patient days) and .64 for another (1,303 patient days). From their careful analysis, no one patient criteria characteristic alone was found to cause the great lack of agreement.

Holmlund's study (A23, Holmlund) was built upon the work of Connor, Wooden, MacDonell, and others. The research team tested various classification proposals and timed the amount of nursing activity provided for patients in the various classes. Schemes using six classes and three classes were tested and discarded in favor of a five class scheme. However, the final conclusion was that only four levels are significantly distinguishable for staffing prediction: self-care, average care, above average care, and continuous care. Tests for agreement on placement of patients into classes were made by head nurses evaluating the patients and by a project staff member using objective forms. Disagreement on the placement of individual patients was less than 10 percent, so the objective form was adopted.

The number of classes in patient classification schemes range from three, the most usual, to nine (B17, Kossack & Longare). The usual names given to the classes are Self-care, Partial Care, and Complete Care. Others refer to these groups as Categories I, II, and III, indicating that III requires the most nursing attention. The names given by still other authors and investigators are related to acuity of illness and care requirements, such as minimal, partial, moderate, and intensive. The Scottish Health Service Studies (C19, Scottish Health Service Studies, No. 9) report the decision to use five classes relating to patient dependency. Dependency is reflected in the category titles of Bedfast/Chairfast/Totally Helpless for high dependency to Totally Ambulant for least dependency.

The variables entering into the patient classification systems are fairly universal: • capabilities of the patient to care for himself, • special characteristics of the patient related to sensory deprivation, • acuity of illness, • requirements for specific nursing activities, • skill level of personnel required in his care, and • patient's geographic placement or status in the hospital system. Not all variables are used in all schemes. The capabilities of the patient to meet his own needs are defined by statements that attest to his ability to ambulate, to feed himself, to bathe himself, and to care for his own elimination.

The schemes are usually developed along a continuum of requirements for nursing assistance moving from little need to great need. Items picturing the behavior of the patient and his special care requirements are ordered along the continuum. At specific points, the patient is judged to be in a different category. Most authors or investigators describe a scheme and provide forms and instructions for using the scheme in classification of patients. Unfortunately, Dunn (C6, Dunn), whose scheme includes not only patient characteristics but also skill levels, does not.

The analysis of the characteristics of patient classification leaves four impressions.

First, the schemes are developed along the physiological dimensions of care primarily. There are few items in the scale that refer to the patient's sociopsychological behavior or requirements. Furthermore, since many of the schemes grow out of acute care settings, the emphasis on these characteristics is not surprising.

Second, little is reported in the literature about the precision with which patients can be classified using the methods proposed. Levine (A40, Levine) reported the test of Connor's scheme. Few have developed mutually exclusive categories. Feyerherm's (A15, Feyerherm) classification draws upon work by the Iowa group and uses a different approach. He uses patient classification as an independent variable in his research *Measures of Hospital Patient Care Loads*. He sets up three classes of care levels: minimal care, intermediate care, and high care, using the parameters of ambulation, feeding, bathing, isolation, incontinence, blindness, and marked emotional disturbance. His system provides categories that are mutually exclusive and are very simply stated. Schick and Wilczynski (B25, Schick & Wilczynski) indicate that the patient is placed in the category that covers the characteristic considered the most serious. Other authors determine final categorization by a system of weights. But the ambiguity of the criteria for placement is expressed in the failure of the authors to report reliability of the classification of patients.

Observer selection and training for classifying patients is almost totally ignored. McCartney, McKee, and Cady (D30, McCartney, McKee, & Cady) reviewed records to confirm reasonableness of the distribution of patients into categories. Schick and Wilczynski made a visual examination of the recorded frequencies of eight of the activities used in classification to estimate accuracy of reporting. Chaska (B3, Chaska) stated that teams of two nurses agreed 68 percent of the time prior to consultation. After consultation with each other they agreed 81 percent. The testing, however, was limited in amount. The article by the Scottish Health Service (C19, Scottish Health Service Studies, No. 9) reported a test for agreement but omitted the details.

The most exhausting test of a patient classification system was made by the research teams of Mainguy, Smith, and Truitt (A46, Mainguy, Smith, & Truitt). This study had a threefold purpose: to test a specific subjective classification tool, to examine its reliability beyond the scope of two hospitals, and to assess its validity. To determine reliability, "all comparative classification data collected were computed to provide bivariant tables comparing the ratings of one nurse to another." Chi-square analysis was found appropriate for data obtained when "two responses are measured on each subject and the correct formula for chi-square (corrected for continuity) in this type of situation of pair comparisons" (p. 46). The exact agreement among nurses using a five scale scheme in the same hospitals averaged 63.10 percent. Under the alternative form of analysis, allowing one degree scale difference, the average agreement among all nurse comparisons of the same hospitals was 98.22 percent. The agreement among all nurse comparisons in three hospitals was slightly lower. This research was carefully designed and rigorously carried out. It does indicate that a scheme can be applied with a high degree of reliability if properly executed.

Third, only Mainguy, Smith, and Truitt's study reported an attempt to test for validity. Connor's classification had been derived from work with a nursing staff and he acknowledged the great contribution of Ruth Preston White. The assumption that the classification scheme he proposed was valid and reliable resides in the data he obtained, in the individuals with whom he consulted, in the distribution obtained in his sampling, and in the statistic to which the data were subjected. However, no formal test of Connor's scheme for validity was reported in the literature review.

Fourth, classification schemes are widely used in staffing methodologies. Application of these is discussed in chapter 4.

Quality Control

The most critical element of a staffing program is the definition and identification of the quality of the product (nursing care) to be achieved and its effect upon the patient. Often staffing is viewed as an end in itself rather than the means to an end. However, the primary element in a program of staffing is the determination of what is acceptable nursing care to that institution. The expectation that changes in nurse staffing will result in changes in nursing care delivered is held by both nurses and hospital administrators. There is also the expectation that quality of care must be maintained. Therefore, the use of measures to determine the effect of changes and the use of methods to maintain control of nursing quality production are essential in staffing programs.

One of the most complicated and confounding areas for study is the assessment of quality. Though innumerable research attempts have been directed in this area, never has a completely acceptable method been devised. Research directed toward tools for the assessment of nursing care quality is vital in nursing. Without valid and reliable tools for quality measurement, progress in the measurement of care requirements, staffing, programs, and staff utilization will lag.

In none of the literature directed toward staffing approaches was there an adequately operationally defined model of nursing care itself. There were no descriptions of the nursing care evaluation programs used by the department of nursing service.

Nadler and Sahney (D33, Nadler & Sahney) present a descriptive conceptual nursing care model in an effort to identify all factors that affect the quality of patient care. The model is a descriptive model utilizing a pyramid approach; divisions and subdivisions of factors are made until basic specific factors are identified. The authors are modest about their efforts and underrate the value of their innovative approach to model building for nursing quality. Their restraint and their questioning attitude toward looking for the answer to quality are admirable. Many writings were concerned with quality and product evaluation, however. The works of Howland, Wooden, Wolfe, Jelinek, Aydelotte, McKenna, Kakosh and Reiter, and others are pertinent in the consideration of quality. They provide materials for a fine theoretical framework which, if synthesized and employed, could contribute greatly to the resolution of the criteria problem.

Reiter and Kakosh's (A54, Reiter & Kakosh) early attempt to develop criteria for the evaluation of nursing care indicates the great difficulty in operationally defining quality of nursing care. The data used in their analysis are nurse-patient interactions obtained through application of the critical incident technique, case writing, observation, and literature review. Materials for an observation guide were submitted to field testing, an expert jury, and analysis by practitioners. The criteria statements that were finally derived from the arduous work have not been widely promoted. It is timely that the ideas of Kakosh and Reiter be reviewed, evaluated, sharply defined, reduced in scope, and built into precise statements for measurement of patient behavior.

McKenna's study (A43, McKenna) is highly illustrative of the problem of defining variables of quality and the difficulty of obtaining agreement among nursing personnel as to what comprises quality. The research staff modified nine scales developed in the Iowa Study to be used as criteria for a Patient Improvement Index. McKenna attempted to build a nursing assessment tool for use but later disregarded the data obtained by applying it. Furthermore, McKenna reported that efforts to apply a nursing audit were fruitless.

The most frequently used tool to measure quality of service has been a questionnaire or tool to measure "feelings of adequacy" or some features of services provided. Feelings of inadequacy of nursing services, defined by responses to items on a checklist, were used by Abdellah and Levine in a large study (A1, Abdellah & Levine). The checklists, one for patients and one for personnel, were carefully designed and tested. The use of the instrument in *Patients and Personnel Speak* should be encouraged in nurse staffing research. It is available. It is applicable in all settings and lends itself by its ease in administration. The instrument was used in other studies reviewed. However, the authors do not purport to examine the effectiveness of nursing practice on specific nursing problems since this was not the purpose of the instrument.

The satisfaction of services and facilities to patients was also used as a measure of quality by other investigators. Huseby (A28, Huseby), Jaco (A32, Jaco), Trites (A65, Trites), and Sturdavant (A64, Sturdavant) used the interview and questionnaire in their studies of architectural variables. Wolfe (A73, Wolfe) surveyed a large group of nurses in prestigious positions to assess factors of quality. The researchers in the Illinois Study attempted to measure efficiency of service.

Alfano, Levine, Rifkin, and Goldman (A2, Alfano, Levine, Rifkin, & Goldman) research and that carried out at Kansas City by Lewis (A41, Lewis) are examples of efforts to obtain long term changes in patient behavior. Lewis collected a vast amount of data about the patient's reaction to services provided, the amount and kind of service, the amount and kind of knowledge held by the patient about his illness, the outcome of medical care, frequency of complaints, etc., and similar outcomes. The researchers at the Loeb Center are also seeking such end results apparent in the population served.

Safford and Schlotfeldt (D36, Safford and Schlotfeldt) attempted to evaluate the effect of increased patient load upon the quality of nursing care provided to patients. With the help of a broadly representative committee of health professionals, they constructed a five-point scale to assess components of optimal care. Five categories of factors entering into nursing care were considered: • physical care, • emotional care, • nurse-physician relationships, • teaching and preparation for home care, and • administration. Using a before and after design and holding staff teams constant, they increased the number of patients for each team. The team consisted of a registered nurse and two practical nurses. The number of patients for the three situations were 13, 16, and 19. The questionnaire, which had been carefully constructed and tested for reliability and face validity and been submitted to internal statistical testing, was filled out by both physicians and patients. The results confirmed the hypothesis.

Jelinek, Munson, and Smith (A34, Jelinek, Munson, & Smith) in their report on the impact of Service Unit Manager system, referred to the use of a *Quality Index* based on sample observations directed toward presence or absence of certain attributes associated with quality. Unfortunately, the instrument to which they referred was not reviewed in this literature search. Use was also made of the expert judgment of nurses and of statements of nurses reflecting their perception of care. A similar approach had previously been used by Miller and Bryant (A48, Miller & Bryant) who included omissions of tasks as a criterion.

Wandelt and Ager (C26, Wandelt & Ager) developed a five-point Likert Scale of Quality that allows all observers to rate directly, indirectly, or retrospectively nurse-patient interaction. Its stated purpose is "the evaluation of the quality of nursing care received by patients" (p. 1). The major concern about this scale is the untested assumptions about the effect of the interaction or intervention upon the patient. Many items appear to reflect the myths in nursing practice.

Rich and Dent (D35, Rich & Dent) developed a patient rating scale to assess attitudes of personnel toward their patients; however, they did not view change in attitude as reflecting change in quality.

Goertzen (A19, Goertzen) made use of a tool, subjective in nature, developed by Pardee called "Standards for Nursing Care." This tool was developed by a committee of nurses at the University of Washington Hospital, and it measured 17 phenomena based on Abdellah's 21 nursing problems defined in *Patient Centered Approaches to Nursing Care.* The author stated that the qualitative scale was used to observe patients. The observer recorded that care was satisfactory, unsatisfactory, not observed, or not appropriate depending upon the observer's perception of how well the criteria were met. The scale was a nominal scale indicating the possession of a distinct attribute of the variable quality. Phenomena were not ranked in importance. Responses were tallied and then totaled for each patient. The tool was not obtained for review. The reliability in use between the two observers was given as .98 and .96.

The authors varied in the number of measures used to assess quality. The most comprehensive works, involving a large number of variables relating to quality measurement or the criterion problem, are those of Levine, Aydelotte, and Tener, the Illinois Study, Jaco, Lewis, Jelinek, Alfano, and Wolfe. These studies, and in particular Wolfe's are examples of the difficulty in measurement and the complexity of the problem of quality determination.

Quality Control Programs

The writings by Blumberg and Drew (D6, Blumberg & Drew) have served as the basic documentation in the Quality Control Program introduced by CASH and adopted by others utilizing the CASH approach. The basic study by these two investigators addressed itself to the identification of techniques used to determine quality of hospital care. An article by the two appeared in 1963 in *Hospitals, Journal of the American Hospital Association.* Its content draws upon the writings of many others and includes descriptions of suggested techniques that have been used to learn if care is "poor" or "good," but the article does not address itself to operationally defining what is "good" or "poor" quality care. Quality is defined by the nature and content of the items in the evaluative instrument used in the various programs purporting to measure it. The content of the items relates to the patient and his condition, his environment, the hospital record, and other documents. The research and the article reflect Blumberg's and Drew's ideas and beliefs about the need for an information system within a hospital that will provide a continuing flow of data by means of which nursing professionals can make judgments about the quality of nursing practice provided patients.

There is nothing in the documents by Blumberg and Drew in which the basic research gives evidence that tests of the various techniques' effectiveness were made or that the presence of a variable made a significant difference in recovery of the patient.

The Quality Control Program introduced by CASH (C2, CASH) makes use of a checklist that rates the presence or absence of an attribute and that purports to indicate quality. The items are stated in the form of questions or statements. Sources of the data about quality arise from the patient, the environment, the chart, and the nursing unit. The attributes are directed toward measuring patient welfare and safety, comfort, and accessibility of immediate needs, condition of his immediate environment, completeness and accuracy of charting, cleanliness, orderliness, and condition of equipment and supplies on the nursing unit. The procedure for introducing, interpreting, and using the Quality Control Program is outlined in the manual. The rationale for the selection of the specific items to measure the attributes, as well as the choice of attributes themselves, is missing from this document. Nevertheless, the items do present operationally a concept of quality care to patients. A nursing committee working with CASH selected the items so one can assume a degree of face validity of the items. The manual emphasizes random sampling, the amount of sampling to be made, the importance of recording, and immediate observation. The observers are drawn from supervisory personnel. This year CASH has discarded their quality control program because of unreliability and inadequacy of data. It was reported that subsequent reports generated by the data can have no meaning to the personnel. At the initial impact, personnel responded to the reports but later failed to be concerned with the results.

CASH's experience with the program is suggestive that something is not right with the program, but it does not lead to the conclusion that the basic concept of continuing appraisal is wrong. Instead it leads one to speculate that perhaps the model of quality is poorly conceptualized, that the variables selected are invalid, and that the instrument used is lacking in sensitivity, reliability, and objectivity. These ideas are in part derived from the progress report of the research study by Wolfe and Breslin (A73, Wolfe & Breslin), in their survey of eight nursing units, four ranked high and four low, based on the rankings of 15 units on the quality of nursing care given by 34 head nurses, supervisors, and instructors in a medical center where the units were located. The rankings were highly consistent. These investigators used a tool incorporating some of the items of the CASH quality control with other items. Although one cannot place confidence in the findings that the authors report since the findings are inconclusive, one cannot help but note that the questions the report raises about the ability of the items to discriminate between nursing units providing low quality of care as against those providing high quality. Only small differences were found among units on items of patient welfare and safety. Patients were generally satisfied with the rooms, and patients' charts showed considerable nurse variation but little difference among the units.

Related Variables

In the literature were found writings concerned with variables that did not deal directly with patient classification, with measurement of nursing activity, or with quality measurement. These variables were indirectly related to staffing, however, in that they reflected probable use of time, or effectiveness of services, or organization of effort.

These related variables are grouped into five sets: • architectural variables, such as design of units, implying travel distance, room placement, visibility of patients, and communication systems; • organizational variables including characteristics of the hospital, the introduction of new roles, redesign of supporting systems, and realignment of authority and responsibility in nursing; • variables relating to nursing staff background, preparation in service programs, turnover, and internal states such as satisfaction and morale; • hours of nursing care variables; and • miscellaneous variables. Many writings included discussions of a combination of variables. Each piece of literature was read to learn if specific findings were included describing the relationship between the related variables under study and nurse staffing prediction.

Organizational Changes

Twelve pieces of literature are specifically concerned with the introduction of the service, unit manager system or changes in other supporting systems. Jelinek's (A34, Jelinek, Munson, & Smith) monograph, pertaining to the unit manager system, includes a study of 55 patient units in eight hospitals. Unfortunately the effect on nurse staffing requirements was not noted. Jelinek, Munson, and Smith reported increases in amounts of direct patient care and standby time of nursing personnel, a reduction in nurse's performance of nonnursing tasks, and an increase in personnel satisfaction. The effect on nurse hourly staffing is not stated; it can only be inferred.

McKenna's (A43, McKenna) ambitious study, thoughtfully carried out, met with many problems of implementation. It is limited in its contribution since the unit manager, the experimental variable in McKenna's research, was assigned as an additional person to the existing staff on the experimental units and an inadequate adjustment was made on the control units.

The most extensive research on the impact of the unit manager system, Schwier and Musiker's (A59, Schwier, Musiker, & Gruen) is not yet reported in full.

Although the studies in the Literature are interesting and informative, only one, Howe's (D23, Howe) reports a transfer of nursing positions to the unit manager system. The general impression of the literature reviewed was that the effect of the unit manager system is useful and worthwhile in that it enables nurses to perform nursing activities, reducing their nonnursing tasks. What difference this has on quality of care and on amount and kind of staff needed was not answered by the few studies reviewed. Only one study, Hughes' (A27, Hughes) which is a descriptive study and limited in controls, challenged the use of nonnursing personnel in the unit manager system. He believed the loss of authority over supporting systems was serious in that it reduced the status of the head nurse and represented a loss of control.

Mergen's (A47, Mergen) research addressed itself to the question of the effect on concentrating authority over all personnel on the nursing unit, including those from the supportive services, under the head nurse, redefining duties of personnel and establishing a flexible staffing process. He found that manipulation of these variables produced a change in work patterns but found no change in time spent on direct care activities. Although his research is very useful in that it identifies the sources of variations in staffing, it does not add knowledge to help solve the problem about authority arrangements and amount of staff required.

On the other hand, Upham's (A66, Upham) study of the drug distribution system is specific in pointing out the effect of such a system on nursing. It provides a quantitative measurement of the effect of a change in a medication system upon both nursing time and hospital cost. The nursing time differentials per patient day was 13.2 minutes for registered nurses and the cost was specified per patient. This study was conducted in a large medical center where the medication rate was very high. Generalizations cannot be made to dissimilar institutions since the features of hospitals differ. But it is a study whose findings suggest that this supportive system may well have an effect on use of nursing time.

Four studies considered the introduction of the clinical nursing specialist role as a variable. One provided guidelines for the introduction of the position (A3, Amidon). Another looked at a new role for nurses as primary care giver (A41, Lewis). Still another was an example of role enlargement (A49, Morgan & Sendberg). One viewed the position as a force in major reorganization of the care, and results are not yet fully reported (A59, Schweir, Musiker, & Gruen). Again, these studies are highly informative and suggestive of new role models for delivery of services, ways of bringing about changes in quality of care and the effect of a new role on traditional practices and organizational structure, but they do not indicate whether basic staffing would alter as a result of the introduction of the role. For example, can either the number or qualifications of the staff be reduced?

Other than Levine's (A40, Levine) study comparing the staffing of Federal hospitals and non-Federal hospitals and the Illinois study (A29, A30 Illinois Study Commission on Nursing), no studies report any attempt to look at the impact of hospital and nursing administrative leadership and organizational characteristics upon the amount of staff required for care. Levine's findings suggest that there are a multiplicity of factors influencing staffing and its utilization. Among the important ones are the administrative practices ~~of the~~ hospital personnel, its autonomy, and selected organizational specializations. Levine proposes that simple, older, established, single goal-directed organizations require less staff.

Levine's (A40, Levine), Jacobs, Patchin, and Anderson's (Jacobs, Patchin, & Anderson), and Newhauser's (A50, Newhauser) research are the only three that explicitly consider the effect of specialization effort. No research, report, or periodical examined specifically the effect of numbers of physicians, medical specialization, training programs, or variations in medical care programs upon nursing requirements. Yet nurses would be the first to say that medical programs, medical practice, and diversity of medical staff have an enormous impact on nursing activities.

The Salmon Committee (A57, Salmon) evaluated several nursing staffs and formulated guidelines for the assessment and readjustment of administrative positions but did not treat the question of what will be the effects on staffing.

Only three studies were reviewed that indirectly deal with support of nursing services equipment, supplies, and care items. One reported lack of adequacy in the supply or equipment items (A61, Smith); another indicated increased travel time if items were absent (A32, Jaco); and the third, that there was an increase in preparation time required because of differences in placement of items (A45, MacDonell, Brown, and Johannson). None reported a specific effect on amount and kind of staffing.

The review of these writings leaves the reader with the impression that there is limited knowledge about the impact of these highly important variables. One cannot, with confidence, say that an increase in supporting services will affect the amount of staff required. One can probably state that direct care and standby time will be increased and that nursing personnel will be more satisfied if supporting services are increased. It can also be said that administrative variables probably have an effect on utilization and amount of staff required. Unfortunately, one cannot report with confidence that under one style of administration less staff is required than under another.

Architectural Variables

The literature search for writings concerned with architectural variables was not exhaustive.[1] But in the current literature review, six major research reports were found that examined the effect of design, travel time required of nursing staff, or both.

Sturdavant's (A64, Sturdavant) work was an early effort to look at structural arrangements of nursing units and their effect upon selected behavior of patients and hospital staff. In a carefully designed study, comparing the intensive nursing service in a circular unit and rectangular unit, Sturdavant and a research team examined the use of time of a nursing staff and the overall satisfaction of patients, relatives, physicians, and nurses. The notable difference between the two study units was the visual contact available in the circular unit. The degree of satisfaction was significantly higher among patients and relatives in the circular unit. The utilization of total nursing time was more effective in the circular unit since nurses in the rectangular unit required more time for travel and for monitoring patients. The research made no attempt to test amount of staff required for the two types of units. But it does show how the two staffs differ in the use of time because of the design of units.

Trites, Galbraith, Sturdavant, and Leckwart (A65, Trites, Galbraith, Sturdavant, & Leckwart) followed Sturdavant's research by a more extensive research project. The purpose of the study was to investigate "the impact of radial, double corridor, and single corridor designs, with minor architectural and systems modifications, on the activities and subjective feelings of nursing personnel on four units of each design" (p. 6). An attempt was made to control a large number of variables, a major one of which was measured by the Patient Control Index. Six conclusions were reached by the research team:

- the radial design was superior to the other two designs and double corridor superior to the single corridor;
- radial units required significantly less travel of nursing personnel, the double corridor was next;
- the time saved in travel was spent in more time with patients;
- the great majority of nursing staff members preferred to work on radial units and believed the design enhanced patient care;
- from a minor study, physicians believed the circular design enhanced the quality of care; and
- the nurse-patient intercommunication system did not reduce the number of trips made by nursing personnel, but the nursing staff on linear units felt that it did and indicated the value of the system. The nursing staff on radial units did not use the system.

Huseby's (A28, Huseby) thesis was conducted in the same institution as Sturdavant's and Trites' and focused upon patient's subjective feelings toward adequacy of services in three types of units: (a) radial, (b) double corridor, and (c) single corridor. Huseby constructed a questionnaire to obtain patient response to selected items and doubts existing about the instrument itself. He found that patients who have been cared for on radial and double corridor units held more favorable opinions about services than did patients on single corridor units.

Jaco's (A32, Jaco) study is a replication of Sturdavant's research. He used type of architectural design (circular, radial, or rectangular shaped units) as the independent variable and the nurse's utilization of the unit as the dependent variable. Although he failed to achieve randomization of intervening factors, his results, though given with reservations, favored the circular unit. He indicated that more direct care was provided, there were fewer trips, resulting in less travels, but he found no difference in patient welfare measures. The circular unit, he proposed, was more convenient and provided more promise of flexibility. The results of the effect on morale of nursing personnel and costs are presented as questionable and should be further explored. Jaco did not test the effect of design upon kind and amount of staff; furthermore, he made no recommendations or proposals about staffing.

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[1] An exhaustive review is in order since this is a major topic for consideration.

Although questions can be raised upon assumptions made and the failure to consider quality in their study, the research by Freeman and Smalley (A17, Freeman & Smalley) is useful in looking at the effect of design of the nursing unit upon cost of employee travel. The findings suggest that medical patients require less personnel travel than surgical patients and that the placement of substations, monitoring devices, and numbers of patients affects amount of travel. Using data from the Atlanta area and a model which they constructed, Freeman and Smalley predicted cost of construction and travel for six types of unit designs. They found that the double corridor, two bedroom, design was least costly; the all private, single corridor design, the most costly. No prediction, however, was made about the amount of staffing required other than that inferred indirectly from travel requirements.

The Illinois (A29, A30, Illinois Commission on Nursing) study drew upon the Yale studies of travel and design. The length of trips and number of trips were determined for 31 hospitals in Illinois. It was found that the nursing personnel traveled an average of 25.6 feet per trip, and the range varied from 11.5 to 48.8 feet per trip.

The results of these six studies, four of which are major ones in the field, indicate that nurses' travel time does differ in type of nursing units. Three studies indicate that in the circular or radial units, nurses spent more time in direct care. The general impression, although one cannot generalize because of the settings and limitations of the studies, is that circular units are favored by staff over the other two types of units. No study addressed itself to the question of difference in staffing requirements. Yet there is the distinct impression that units differ greatly in travel distance and time. Whether or not the distance and time required is sufficient to require more staff in single corridor or rectangular units is not known.

Nursing Staff Characteristics

A number of different variables relating to the nursing staff were found in the studies reviewed. One grouping of studies was concerned with nursing staff satisfaction, turnover, and propensity to leave their present positions. Nursing staff's perception of adequacy of services was sought in a number of studies. Levine and Abdellah (A1, Abdellah & Levine) found the response of adequacy of service related to the amount and the number of nursing hours per patient. Jaco, Trites, and Sturdavant (A32, Jaco; A64, Sturdavant & A65, Trites, Galbraith, Sturdavant, & Leckwart) found nursing satisfaction related to architectural design. Trites used the subjective feelings, such as expression of tenseness, anxiety, psychosomatic disturbances, fatigue, and perceptions of work efficiency and workload in his research.

The most comprehensive and best designed research study relating to nurses' turnover, propensity to leave, and absenteeism was Lyon's (A42, Lyons). The research, based upon a well developed theoretical framework, is concerned with overload tension and satisfaction with the job, the hospital, and with the nurse's immediate superior. He hypothesized a relationship between role clarity and organizational measures of coordination and communication with turnover and propensity to leave. Lyon found that the feeling of being able to get the work done related to propensity to leave but not with turnover.

Four other studies dealing with satisfaction were conducted by graduate students at the master's level. Bishop (A6, Bishop) explored the level of satisfaction among workers on a small two-unit medical and surgical nursing unit by posing a series of questions pertaining to supervision, salaries, hours of work, and domestic responsibilities of the staff member. The limitations of the study are many, and it can be considered only as a pilot effort. The interesting findings are that there were differences between professional and nonprofessional personnel as to what contributes to satisfaction and that satisfaction with supervision decreased with amount of professional preparation of the individual responding to the items on the questionnaire. Spitler (A62, Spitler) used an instrument called the SRA Employee Inventory to determine selected aspects of job dissatisfaction. Among several points indicating dissatisfaction was given "job demands," but this phrase was not adequately defined as to its meaning. Lamberton, (A37, Lamberton) in an interesting thesis applying ideas drawn from Herzberg's Motivation-Hygiene theory, found the theme of achievement permeating the 19 interviews. Newstrom (A52, Newstrom) found that a very small sample of supervisory personnel were lacking in adequate orientation to their job and this lead to dissatisfaction.

These studies are few and, except for the research report mentioned, are too limited to draw any generalizations about the relations of nurse satisfaction and other variables. They point to relevant questions for research. However, Lyon's study merits attention. His definitions are well developed, the research is sophisticated, and his findings are pertinent. Other than Levine's and Abdellah's, none of the other studies provide knowledge about the amount and kind of staff required in order to provide satisfaction to personnel.

A set of six studies examined the question of inservice education and change in nursing staff performance. The Iowa Study, using two types of inservice programs in three experiments, found that no change in patient welfare resulted after the staff had been given additional training (A5, Aydelotte & Tener).

Though making no direct contribution to nurse staffing design itself, Wooden's (A74, Wooden) comprehensive study provides knowledge about the impact of an education program designed to improve the nurses' ability to function freely and constructively in the work situation. Unfortunately, it does not fully depict how nursing behavior changed. Behavioral congregations (defined by clustering of nursing groups at the nursing stations) were reduced significantly after the educational program; however, the periodic surveys later indicated no change. After the training sessions, the personnel behavior tended to focus more on actual patient contacts than on conventional task accomplishments. How this change would have been reflected in work sampling is an interesting speculation.

Two studies, that by McLemore and Hill (A44, McLemore & Hill) and Ingmire and Taylor (A31, Ingmire & Taylor), were extensive studies involving continuing education programs focused on leadership skills. Several measurements of leadership were taken and the training programs in both experiments were described in detail. In both experiments, few differences could be identified as attributable to the programs themselves and the effect on staffs in the participant's hospitals and their own productivity is not known.

Straub (A63, Straub) was interested in learning if job satisfaction, as measured by Bullock's instrument scores, would increase following a cooperatively developed inservice education program. The nurses in the sample were 35 nurses who held general staff positions or assistant head nurse positions. Straub drew the conclusion that job satisfaction scores increased as a result of the inservice program. However, because her research was not an experimental study and consequently controls were not built in, one cannot say that the increase was due to the program itself. Other confounding variables could have entered into the change.

Miller and Bryant (A48, Miller & Bryant) also introduced an inservice program in their experiment. They found that personnel, after having been introduced to the concept of skill level requirements for tasks, adhered more closely to their appropriate task levels of work. However, the program did not result in any increase in quality as the investigators were measuring it.

The question of the impact of inservice nursing education programs was not explored fully. However, the studies reviewed were major research efforts. The impression resulting from the review of these few is that the impact of inservice education programs upon staff performance, either their ability to achieve greater workload or to obtain higher quality of care to patients, is still obscure. There is some evidence that the programs do effect a change resulting in increased patient contacts. The relationships between amount of staffing and inservice educational programs are not identified. The question, Does an inservice educational program result in greater efficiency and economy of staff? is unanswered.

Nursing Hours Per Patient Day

A limited number of research efforts provide actual nursing hours per patient day (NHPD) and the validity and reliability of those studies are in most instances questionable. Techniques are loosely described, samples are small or ill defined, instrument testing is deficient, rationales are weak, and in most instances care quality is assumed based on judgments of the nurses involved. The studies vary greatly in scope and quality. Most apply to specific hospital situations, and underlying assessment techniques are similar. Techniques applied draw heavily on CASH, Flagle, and Connor (C4, CASH) (A16, Flagle) (A11, Connor). The timing of nursing activities through work sampling, continuous observation, and self-reporting, in relation to patient requirements, provides the base and involves the development of standard activity times. In most studies patients are categorized according to nursing requirements or, as described by Connor, (A11, Connor) their degree of "self sufficiency." The defined patient categories most often adopted or adjusted for use are those developed at Johns Hopkins University by Connor, Flagle, Preston, and White; (A11, Connor) (A16, Flagle) (D34, Preston) (A71, White, Quade, & White) I. Self Care, II. Partial Care, III. Complete or Total Care. Those defined by Ludwig (B19, Ludwig) and percent of staff time required for each are "Self Care, 26.7 percent, Partial Care, 21.4 percent; and Complete Care, 14.3 percent" (page A-2). He reported NHPD as 2.9, built around the average patient (B18, Ludwig). Dunn (C6, Dunn) selected four categories: I. Intensive Care, II. Intermediate Care, III. Moderate Care, and IV. Minimal Care. Moriconi (B23, Moriconi) identified the need for a fourth category, that of intensive care based on extent and frequency of patient requirements and established that 7.5 hours were required per 24 hours of nursing. This figure included patient observation, treatment, and emotional support. Other categories also based on degree of care are I. Minimal Care, II. Moderate Care, and III. Maximum Care.

Methods of reporting vary in most instances. Personnel skill levels and skill requirements for nursing activities are defined in varying degrees and are reported for skill levels by NHPD in percents of personnel time and man-hours required. RN, LPN, and aide levels are most often identified. Though categories of patients mix, other, or a category in which any skill level was used, may or may not be identified. This was reported according to man-hours required by hours of the day, by task levels, and personnel skill levels. Reported hours of patient care may or may not include supervisory, nursing administration, and ward clerk time. A study conducted by the VA (C23, Veterans Administration) was devoted exclusively to a study of ward administration activities in which a methodology for developing staffing criteria is determined. CASH (C4, CASH) defined HPD for housekeeping, dietary, and central services.

Direct and indirect care times are often reported and may be expressed in hours of patient care or in percents of personnel time. Care requirements are usually determined for night, day, and evening shifts though some are concerned with the day shift only or with specific hours of the day. NHPD are usually identified by services and wards.

Most studies are conducted in a one hospital situation and cannot be replicated for use in other hospitals. Rueckert (C16, Rueckert) and Crane (B11, Crane & MacLeod) provide methods for determining staffing, but guides such as the one developed by the VA (C25, Veterans Administration) are applicable to a variety of hospital situations.

The greatest contributions made to the question of nurse staffing are those of Levine (D27, D28, Levine). In (D28, Levine) he identifies the great diversities in nurse staffing among 5,399 general hospitals and presents a picture of the amounts, levels, and staffing ~~ratios of~~ patients to personnel according to geographical location, hospital size, census, control, and area population. These are expressed in indexes of diversity. In his treatise on "Some Answers to the 'Nurse Shortage'" (D27, Levine) he concludes that numbers of personnel are not the answer to the nurse shortage but that the answer lies in the qualitative aspects of nurse staffing. In some degree, Levine bases his findings on his earlier study of diversities. His premises are well developed and lead to logical conclusions.

Only a few of the research efforts provide a standard NHPD for hospital use; these include Abdellah and Levine (A1, Abdellah & Levine) (B5, CASH) (C17, SCALE) 4.7, 2.5 professional; CASH 4.90; and SCALE 4.0. It must be recognized that the value of these measures is questionable, due to deficiencies in measurement, and provide only gross figures from which to work. They are based on average patient loads. The question is, Can you depend on an average patient load existing at all times? It is stated by Levine that numerical ratios such as hours of care per patient do not provide a satisfactory standard for a hospital to use as a guide for staffing and utilization, for it cannot be demonstrated that the amount of care available per patient is directly related to patient welfare. Adequacy of staff utilization was found to vary greatly among hospitals, and hospitals varied greatly in the average daily hours available. The confounding question of patient care quality arises in the evaluation of these research studies. This assessment was ignored, assumed, or poorly assessed. It becomes obvious that NHPD is less than satisfactory in staffing determination. It appears that the use of guides and procedures applied to specific hospital situations is a more logical approach.

Miscellaneous Variables

Three studies, Jacobs (A33, Jacobs, Patchin, & Anderson) Gaus (A18, Gaus), and CASH (B8, B9, CASH) examined the effect of age upon nursing care hour requirements. Gaus' study was conducted within one institution; CASH extended their analysis to several, and Jacobs, Patchin, and Anderson's is a large national study involving 54 hospitals. These three support each others' findings that the over 65 years of age patient group exceeds the under 65 years of age group in hour requirements. Jacobs, Patchin, and Anderson's study, the most comprehensive of the three, reports that the 65–74 year old group requires more than 21–31 minutes per day and that the 75 year and older group needs 55–79 minutes per day more. He found that there was little difference between adult medical and adult surgical patients and that specialization efforts of the hospitals were not factors in the amount of care required.

McKenna (A43, McKenna), Jaco (A32, Jaco), Jelinek (A34, Jelinek, Munson & Smith), Freeman and Smalley (A17, Freeman & Smalley), and Saren and Straub (A58, Saren & Straub) were interested in the variable of cost. The majority of all the methodological approaches to staffing were also highly concerned about the control of costs. However, none of the studies reviewed was successful in isolating the variable of cost-effectiveness in relation to nurse staffing. The problems of defining cost, of obtaining reliable data, and of isolating the dependent variable, quality, were recognized by many other authors.

Yett (D18, Yett) and Bognanno (A8, Bognanno) present highly interesting and relevant material about the shortage of nurses using different economic models for analysis. Yett outlined a number of factors that contribute to nursing shortage. The difficulties in the assessment of it are ably described. Bognanno examined the economic forces that are required to return the married nurse to the labor market. Both of these authors, Yett in particular, provide provocative pertinent data about the dilemma confronting employers and especially the public.

Summary

Since a summary has been provided following each of the sections of this chapter, only a few highly pertinent findings will be brought together at this point.

- The quality of the literature reviewed and critiqued varies greatly. The literature is vast in amount and appears in all forms of publications. There is a great lack of rationale, documentation, and descriptions of problems well described and structured.
- The number of variables treated in the literature numbers into the hundreds and are classified by the discipline from which they originate, the purpose they serve, or their source. In many of the studies, the variables are ill defined.
- Nursing activity is measured by standard methods drawn from engineering. The techniques used are feasible and, if appropriately applied, provide reliable data. The use of the techniques in literature reviewed varies greatly in precision. The question about nursing measurement is the appropriateness of applying these methods to the study of nursing practice. These techniques measure nursing as it occurs in practice. The

tasks, activities, and categories of nursing work appearing in the literature do not reflect the nature and full character of nursing practice.

- Patient classification schemes are used to quantify the workload created by patient care demands. These schemes are built around a set of variables fairly universal: (a) special characteristics of the patient, (b) capabilities of the patient to care for himself, (c) acuity of illness, (d) requirements for specific nursing activities, (e) skill level of personnel required in his care, and (f) placement of the patient. Most schemes are a modification of Connor's. Reliability of the data obtained through use of the scheme and validity are very serious problems.
- Quality control is approached through measurement of specific attributes found in the patient, in the personnel, or in the environment. No well developed operationally defined model of nursing care delivery systems was found. The most frequently found tool to measure quality of service was the questionnaire or tool to measure "feelings of adequacy" or some feature of service provided. The problem of quality measurement is complex and difficult. Lack of tools is serious.
- Knowledge about the impact of organizational variables upon nurse staffing is limited.
- Nurse's travel time differs in nursing units of differing architectural design. Circular units are favored over other units. However, whether or not more staff is required in one type of unit, classified by design, is not known.
- Nurse's response to their perception of adequacy of service is related to hours of nursing care.
- The relationship of nursing satisfaction and dissatisfaction to workload and staffing is not known.
- The effect of educational programs upon staffing requirements has not been examined to any great extent.
- The span of workload which a nursing staff can carry without reduction in quality of care was reported in only one study.
- On the average, medical and surgical adult patients over 65 years of age require more care than patients under 65 years of age.

Chapter 4

Staffing Methodologies

The methodologies described in the literature fall into four major classes: • descriptive, using a number of variables, survey methods, and the subjective judgments of individuals; • industrial engineering; • management engineering;[1] and • operations research. These methodologies also represent a gradual increase in the application of logic to the problem and the use of abstraction in its resolution (figure 3).

For the purpose of understanding the discussion that follows, the terms "methodology" and "approach" and these four classes of methodologies are defined.

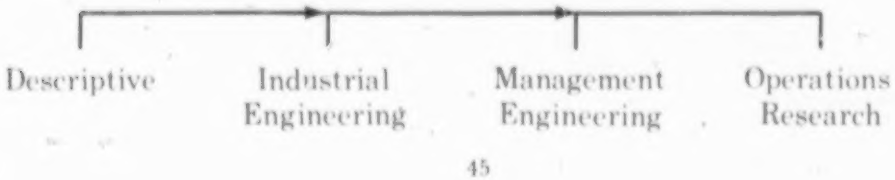
The term "methodology" is used to describe a "logically and procedurally organized arrangement of steps. When formally documented or utilized, these steps may constitute a science or method for whatever discipline uses them" (p. 461).

The word "approach" means a "preliminary step or manner of advance" (p. 464).

The first term "methodology" was seen as a much larger concept than the latter. The term "approach" was more limited in that it represented an orientation and did not encompass the full methodology.

The descriptive methodology makes use of a number of data gathering devices about a large number of variables. The relationships of these variables are not clear. The final decision about amount of staff resides in the subjective judgments of individuals who have had a background of experiences. The approach may use simple ratios, formulas, and suggested proportions between types of personnel. However, there are no consistent strategies in the methodology. The industrial engineering methodology is directed at the study of nursing work on a nursing unit. It uses the techniques of work measurement, work distribution, task or function analysis, procedure analysis and the like. It is primarily directed at reorganization, reassignment, and redistribution of work on specific nursing units. The management engineering methodology is characterized by its purporting to draw upon common sense. It utilizes tools and techniques from industrial engineering and from systems analysis and builds upon findings from operations research studies. The component strategies include seven: • a statement of performance objectives, • an

Figure 3. Evolvement of methodologies for the study of nurse staffing, application of logic and increases in abstractions.



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[1] This category is used since it is a general term applied to the methodology desscribed in *Dollars and Sense*, a study report prepared for the W. K. Kellog Foundation by Patric E. Ludwig, October 1971. Individuals are referred to this monograph for information about the extent to which this methodology has been used.

analysis of components and functions, • distribution of functions, • scheduling, • training of individuals for use and testing of the system, • installation of the system, and • quality control. The operations research methodology is directed toward enabling one to make decisons for real life situations. Mathematical models are built to represent real life problems and the model is tested for providing solutions. The essential elements are abstracted from the situation so that a relevant solution to the problem can be examined. The structures of solutions are explored and procedures are established for obtaining them. The optimal solution and set of procedures are then made available.

Since authors of the pieces reviewed often utilized the same techniques, such as counting, patient classification, work measurement, and many of the same variables, a set of arbitrary rules was drawn up for classifying methodologies. The rules established exclusive categories. The descriptive methodology is one in which there is no quantification of nursing work and no use of patient classification systems. The methodology drawn from operations research requires the construction of a mathematical model.

The industrial management methodology employs methods from industrial engineering and restricts its study to the nursing unit. It does not include the full range of strategies seen in the management engineering methodology and does not interface the work on the unit with systems of the hospital. It does not include patient classification.

The management engineering methodology must give evidence that the majority of component strategies are present, although completeness of each component may vary. Many used mathematical tools in their research. It may draw upon the research conducted by persons using operations methodology.

These four types of methodologies for the determination of nursing staff required in a hospital are described in the research reports, reports, manuals, pamphlets, and the guides reviewed in the literature. Linkages between the work of individuals are discernible, although the time at which the linkage occurred is not known. Many of the writings are undated and personal contact by the investigator was not made with individual groups to learn precisely when the program was initiated.

The majority of the manuals, pamphlets, and guides are poorly written. Little is included in them about rationale or assumptions underlying the methodology being described. Protocol and procedures are sketchily outlined. The reproducibility of forms is possible in all but one manual on staffing; however, the use of many of the manuals would not be possible without consultant help. Some reports of application of scientific methods were obtained that clarified the methodology considerably.

The exceptions of these statements, however, are four manuals: those prepared by Gunn (C7, Gunn) the USPHS Division of Nursing (C22, HEW, PHS) the VA (C25, Veterans Administration), and the Operational Research Unit, Oxford Hospital Board (C13, Operational Research Unit). Gunn's approach includes an extensive literature review and the writing is detailed and specific. The guide, *How to Study Nursing Activities in a Patient Unit* (C22, HEW, PHS) is a model that could well be followed for its explicitness, lucidity, comprehensiveness, and direction. Likewise, the VA, *Nursing Service: A Guide for Studying the Utilization of Nursing Services Personnel in Veterans Administration Hospitals* (C25) is simply written and gives examples of forms, tables, and calculations. In this guide, the author anticipated many problems that might be encountered and included directions or suggestions for resolving them.

Descriptive Methodology

There are a number of writings that reflect this approach. The U.S. Department of the Army (C20, U.S. Department of the Army) uses field analysis and survey data on which to base staffing tables. The ANA (C1, American Nurses' Association) provides a listing of 17 factors and proposes guidelines for making subjective decisions. Gunn's manual (C7, Gunn) is lengthy and very detailed. Paetznick's writing (C14, Paetznick) refers to ways of collecting a large amount of descriptive data, includes a number of forms readily reproducible, and gives in outline form many excellent suggestions. The mathematical formula for staffing newly constructed units in the National Health Service, Great Britain, resulted from an extensive survey and subjective judgment (C8, Her Majesty's Service).

One example of the descriptive method is the simple steps described by Ludwig and Humphrey, (D29, Ludwig & Humphrey) that they entitled "Staffing by Nursing Care Hours per Patient Day." After attempts to use census variation data; that is, the mean and standard deviation obtained from a lengthy study of census, the authors resorted to a simple approach. Each supervisor sets the number of nursing personnel she believes is necessary to do an adequate job at a specific census. Nursing hours per patient day are calculated and a daily basic staffing agreed upon. Staff are added or removed depending upon nursing care hours per day available.

Descriptive methodology leads to a staffing program that is based upon judgment and experience. It does not attempt to control variables or to relate them on a daily basis.

Industrial Engineering Methodology

In the early years a number of individuals, such as Hudson (A26, Hudson), Mergen (A47, Mergen), USPHS Division of Nursing (C22, HEW, PHS), Miller and Bryant (A48, Miller & Bryant), Bartscht (D4, Bartscht), and Hansen (D20, Hansen) contributed to the thinking about the application of engineering concepts to the study of nursing. Articles by Bartscht (D4, Bartscht), Steiner and Lindquist (D41, Steiner & Lindquist), and Hansen (D20, Hansen) serve as examples of the industrial engineering methodology. Work sampling studies were done on selected nursing units at varying census levels. The work sampling data were used to evaluate activities of nursing personnel, the required nursing needs to be met by various classifications of personnel, and the activities by time intervals to determine work distribution. Adjustments of staffing were made as a result and a cyclical staffing pattern established. This methodology arrived at a staffing program directed toward utilization of personnel but no control of other variables.

Management Engineering Methodology

The Johns Hopkins Operations Group made use of industrial engineering methods in their basic studies but enlarged their work to include operations research methods. This group includes the work of Connor, Flagle, Eng, Ruth Preston White, Kerr L. White, and others. The basic research of this group has been applied by many investigators and authors. However, recognition of the linkages is often difficult because of the failure of authors to acknowledge the influences and writings of others.

Although Connor's work (A11, Connor) itself fits the criteria set for operations methodology, it is reviewed in this section since many of the authors refer to his research. Based upon data obtained by continuous observation and timing the amount of direct care provided by 96 medical and surgical patients, Connor proposed a plan for variable controlled staffing, using a patient care index. This concept was also reported in the research studies of Young and Eng (A77, Young), and Wolfe and Young (D45, Wolfe & Young, Part I). The rationale for the patient care index and plans for staffing is drawn from 8 months of study. Patients on 29-bed medical units were classified each day for 8 months, using the criteria and scheme described by Connor. Daily hours of direct care were determined by the index.

$$I = .5N_1 + 1.0\,N_2 + 2.5\,N_3, \text{ where:}$$

N = the number of patients in each category, and the figures = the amount of direct care in hours.

Connor, Young, and Eng concluded that the index is useful in predicting variation in nursing load and that staffing could be adjusted in keeping with the nursing load by providing a basic staff and adding supplementary personnel when necessary:

Using work sampling techniques and sampling four medical units for 2 months, they found that 60 percent of direct care is provided between the hours of 9 a.m. to 12 a.m. Other activities remain fairly constant through the period 8 a.m. to 6 p.m.

As a result of these and other studies, Young and Connor proposed the concept of "Controlled Variable Staffing." The steps involved in this method are:

(a) the charge nurse fills in the classification form for patients on the unit;

(b) the nursing supervisor or the assistant nursing director determines the classification of each patient according to the criteria for Categories I, II, and III; and

(c) the assignment of nursing personnel to adjust to the workload is made by the supervisor, who exercises her judgment and uses her experience, familiarity, and knowledge as best she can.

The prime adopter and mover of Connor's and Flagle's findings was the Commission for Administrative Services in Hospitals (CASH), who modified it in application by including other components, drawing also upon systems analysis and other industrial engineering techniques. The thrust behind this adoption, however, was that of Booz-Allen Methods Service, the well known hospital consultant firm that was very active in the Los Angeles and Pasadena area in 1963.[2] The establishment of CASH's program in nursing, its feasibility and apparent success have given rise to many others, of which five specific consultant groups were studied in this literature review (figure 4).

The authors of the manuals acknowledge the use of the ideas of the parent program although, from the reported details, the relationship between CASH and FACTS (Formula Analysis and Control Technique for Staffing) is less clear than the relationship between CASH and the others. However, similar variables are considered, the range in the length of the data collection period is approximately the same, and the protocol is comparable. A set of like reports is generated. A committee comprised of the engineers and nursing committee

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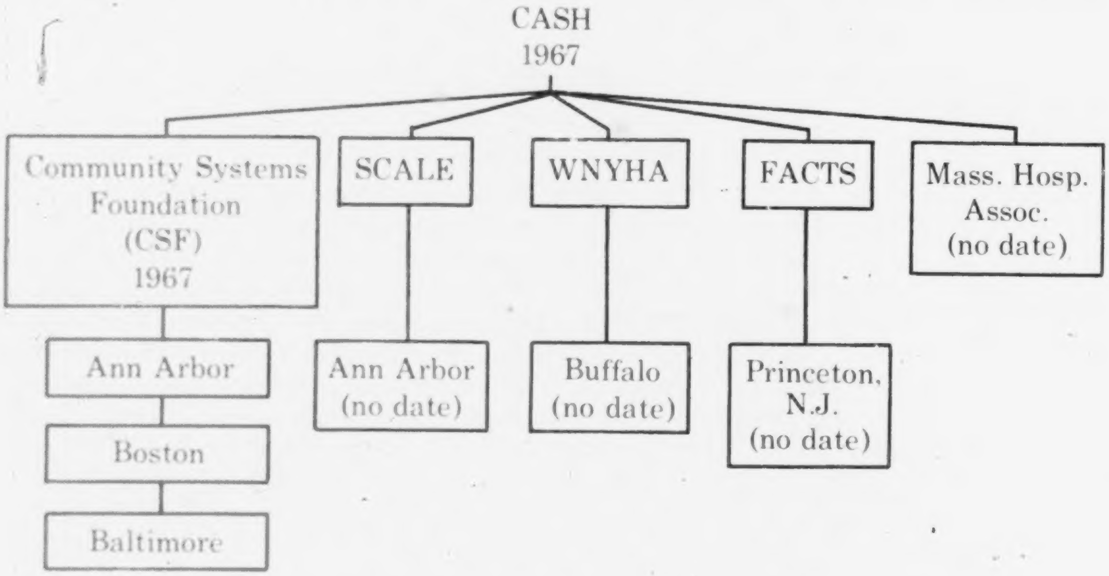
[2] Personal interview with Claire O'Malley, Director of Nursing, Pasadena Medical Center, May 12, 1971.

Figure 4. Organizations adopting or modifying the CASH nurse staffing program.


CASH
1967
Community Systems Foundation (CSF) 1967
SCALE
WNYHA
FACTS
Mass. Hosp. Assoc. (no date)
Ann Arbor
Boston
Baltimore
Ann Arbor (no date)
Buffalo (no date)
Princeton, N.J. (no date)

established a procedure manual and time standards for each procedure for both CASH and FACTS.

These programs are directed toward enabling an individual hospital to determine its own staffing requirements, based upon patient classification (except for FACTS and CSF), to review and establish procedures performed by nursing personnel and to make use of its own variations in policy and administrative procedures. The component parts include statement of objectives, analysis of functions, distribution, scheduling, training, and quality control. The success with which these are carried out varies from situation to situation. Some components of the program, such as performance standards and quality control, are of questionable value. The reports read did not always show the full application of systems analysis indicating linkages, input and output factors, and the relationship between nursing and other systems. The relationship (interfacing) between nursing and other units could only be inferred from the questions and guides and the illustrative materials provided.

The general steps in the protocol for making use of the methodology follows a set sequence. There are six parts, although some overlapping and deemphasis of phases occurs depending upon which consultant group is advising:

- There is initial planning and orientation of the staff in the hospital, usually involving the establishment of a nurse utilization committee. If the decision is made to limit application of the study to specific nursing units, the committee selects the nursing unit or units to be surveyed. The committee compares the procedures of the hospital to the standard manual of procedures provided by the consultants. The committee decides which procedures can be carried out by various levels of nursing personnel;
- The basic care and special care procedure survey forms, the forms for collecting bed occupancy statistics, and patient classification schemes and forms are prepared by modifying the standard forms provided by the consultants;
- Orientation and training sessions for the nursing staff to be involved are held by the consultant;
- A 1-day trial is made;
- A 10- to 14-day survey is conducted; and
- Data are analyzed and reports prepared for the hospital administration and others designated by him.

The factors (variables) collected and used in the calculation of the staffing tables and for preparation of reports and recommendations by the consultants are these:

- nursing procedures (tasks);
- the frequency of these tasks, the time of day performed, and the skill level of the individual performing the task;
- census data, such as number of admissions, discharges, transfers, and occupied beds;
- the number and types of personnel employed in the nursing unit;
- the skill level of the worker desired to perform the procedure;
- the number of patients classified by level of care: self-care, partial care, and total care; and
- the standard time allowance for the performance of each procedure.

Of the five that are modifications, adaptations, or concurrent developments of the CASH approach, two, SCALE and FACTS, differ. SCALE (C17) examines the allocation of tasks to the category of patient and, using data about the Class II patient, applies multipliers to that basic staffing for the hours of the other two categories. These multipliers were described as derived from CASH, the University of Michigan Bureau of Hospital Administration, and the Johns Hopkins University. The multipliers are .5 for Category I Self-Care Patients; 1.0 for Category II Partial Care Patients; and 2.5 for Category III Total Care Patients. The basic staffing of 4.106 hours per Category II, medical and surgical patients, is given in the manual. SCALE's proposal for allocation of the total hours for patients regardless of classification on a nursing unit is suggested as:

(a) allocation of hours by period of 24 hours: 45 percent days, 37 percent evenings, and 18 percent nights;
(b) allocation by levels: 30 percent registered nurses, 20 percent licensed practical nurses, and 50 percent aides or auxiliaries.

SCALE also includes in the data collection the number of patients over 65 years of age. These allocations are also proposed by CASH.

FACTS (C15, C16 Rueckert) established a formula system giving a value for individual patients and thus modified the patient classification scheme used by CASH. A care value is computed for each patient based upon amount of basic, routine, and special care. FACTS also looks at task sensitivity, identifying the time of day when a task must be done. However, all of these programs are concerned about distribution of work and, therefore, all look at peak loads of nursing work. FACTS examines specifically when the task must be accomplished.

The method used in the manual prepared by Scottish Health Service (C19, Scottish Health Service Studies, No. 9) draws also upon industrial engineering methodology and systems analysis. This approach makes use of a formula for day staffing that resulted in information obtained through survey and work analysis. Data were obtained through continuous observation of nursing activity, recorded to the nearest minute. These data were then reduced to 81 categories; then sorted into five major categories. Patients were classified into five categories. The formula proposed reflects the type of variables analyzed:

$W = N[F(B + T) + A + D + M]$ where

$W =$ average weekly nursing workload in hours,
$N =$ average number of patients in ward,
$F =$ patient dependency factor for ward specialty,
$B =$ time in hours per week required to maintain the standard of basic nursing care for a totally helpless bedfast patient,
$T =$ time required for technical nursing of the ward specialty expressed in percentage of time spent on basic nursing,
$A =$ time per patient per week for administrative work,
$D =$ time per patient per week for domestic work, and
$M =$ time per patient per week for miscellaneous work.

Standard times were established for the basic nursing time per week required for the fully helpless patient. Dependency factors were then developed, taking into account the specialty of the ward and computed on the dependency categories obtained and the amount of basic care provided each category.

The pamphlet published by the Operational Research Unit (C13, Operational Research Unit, No. 9) draws upon the research of the Johns Hopkins Operations Group and upon the research by Barr. Briefly the steps in the methodology are:

(a) The nurses report data on the nursing care form during the survey period, usually 14 days;
(b) Patients are categorized into three or five groups, an expansion of the Johns Hopkins model;
(c) Applying a ratio of 1:2:5, these numbers are converted into a workload index. If a five-care grouping is used, the load can be computed from a table, experiencing the calculations;
(d) Using regression analysis and using data obtained through work sampling or continuous observation, specific ratios can be developed for the individual hospital and applied to its population.

Although this pamphlet establishes a workload index, it does not make specific recommendations about staffing. The manual stresses the value of the workload index in assisting in the assessment of care and in the provision of information as to the length of time a patient is in a particular state. The manual includes an interesting figure, schematically diagraming the application of care group classifications and the effective use of hospital resources.

The methodology proposed by Chaska (B3, Chaska) draws upon the work of Conner, Dunn, Howell, Price, and Ryan and is similar to the others. Basically it is an attempt to predict the number, qualifications, and schedule of nursing staff from the requirements of patients for nursing care. Specific generalizations are made by Chaska about the requirements for care. The amount of nursing care is more related to differences in amount of care than it is to numbers of patients. The severity of the illness is not necessarily related to amount of care. The nursing care requirements vary from one time of day to another.

Chaska makes the assumption that nursing staff at the assistant nurse leader (head nurse) level can consistently categorize patients and the staff level needed to care for the patient in each category. Furthermore, a second assumption is made that this same group can estimate the average amount of time each person would spend in giving the care to a patient in each category.

Assumptions and a preamble are built into the classification scheme that draws upon Dunn's (C6, Dunn). These assumptions refer to responsibility of the professional nurse, her knowledge and skills, and the contribution she makes. The assumptions about the patients who fall within each category reflect self-help, need for instruction or emotional support, need for techniques based on five psychomotor skills, need for observation, etc. Professional nursing is seen as personal services and supervision, drawing upon a body of clinical knowledge and intellectual skills.

The procedure used in the methodology is as follows:

- (a) The number of patients who fall within the Categories I, II, and III are determined for two shifts, day and evening, for 2 weeks;
- (b) An estimate of the average amount of time spent for a sample of patients in each category is made in the morning every day for 2 weeks;
- (c) An administrative decision is made to designate the number of patients one member of the nursing staff may be assigned to care for in each of the three categories. These standards are determined for the day, evening, and night shifts;
- (d) The total number of patients in each category, the total time based upon time estimate, the number of patients needing more than one nurse, the number of additional nurses required, and the average time required of the added nurses are calculated from these data;
- (e) From these calculations each nurse leader develops models for her unit, utilizing factors about the workweek: days off per week, vacation allowance, length of work period in days, and pattern of weekends off;
- (f) The nurse leader then selects a model that best fits the existing pattern of staff and their skills; and
- (g) This becomes the basis of a cyclical staffing system which is enlarged by full- and part-time persons.

The tools (forms) which are used consist of:

- (a) A form for the time study and identification of variables influencing time, and
- (b) Patient classification form and guide for use.

Holmlund (A23, Holmlund) acknowledges the impact of Connor's and Flagle's work and uses the data in his comprehensive study of patient classification systems, which also includes observation of nursing activity provided patients which had been classified into three groups. Observers in patients' rooms during the day, 8 a.m. to 4 p.m., noted which personnel entered the room, the time of entry, and the duration of each activity and its description. The activities were coded into 19 functions. These were then classified into four function groups reflecting the degree of training required of personnel to perform the function. Function profiles were developed for each class of personnel. Standard times to perform each group of nursing functions were determined for each patient category.

Holmlund's study group proposes a unit assignment method. A unit is the number and mix of personnel required to care for a specific number of patients in a class. The unit staff are only concerned with delivery of nursing care. A distinct ward staff is proposed to provide administrative and specialist support for the unit staff. The number and levels of individuals required are projected in a table "Estimated Unit Size and Staffing Based on Patient Category." The table includes the average time for each function by patient categories (predictions for surgical and medical patients are separated in the table), the time per patient per unit nurse, the time per patient per assistant, the optium number of patients per unit staff, and the number of assistants per nurse.

Holmlund's group does not specify exactly how to use these ratios or units. He does discuss how the modules could fit, favoring the establishment of wards for minimal, average, and above average levels, utilizing the movement of patient from one ward to another as care requirements change, thus proposing a progressive patient care plan.

The assumptions underlying the management engineering methodology appear to be five. *First*, the assumption is made that patients can be classified into three or more groups and patients require a different amount and level of nursing care depending upon the group in which they fall. The dimension along which the decision for classification is made is primarly physiological. The research of Connor serves as the basis of this assumption. Recently the daily classification of patients has been deemphasized in the CASH program. The data reported appeared so distorted that its reliability was questioned by the consultants.[3]

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[3] Interview with Mr. Buck, Assistant Director, CASH, May 12, 1971.

Second, the authors rely upon the concept of the "average patient" and the "average care" he will require. Again the assumption is based upon the research of Connor and upon industrial engineering rationale.

Third, the assumption is made that nursing care consists of a series of procedures that are discontinuous and discrete in nature. There is a beginning and an end of each procedure. Other than frequency, these procedures vary little from hospital to hospital and from nursing unit to nursing unit. The knowledge and skill underlying each procedure can be identified and assigned to a specific category of works in the nursing department. The illness of the patients will not be a major factor in the time required to perform the procedure. Procedures are performed for patients in a time sequence, and it is possible to rearrange this sequence to make better utilization of nursing personnel.

Fourth, nursing units under scrutiny reflect the quality of nursing care desired and the level of economy and efficiency believed feasible by the administration of the hospital. The *fifth* assumption is that the identification of the frequency with which nursing procedures are performed and the application of standard time, predetermined through wide sampling, comprise beginning attempts to quantify nursing care requirements.

From the analysis of these data and its application to patient classification data and from the suggested reassignment tasks to different levels of workers, several reports are generated. These reports consist of an actual staffing plan, a recommended staffing plan, a staffing allocation guide, a report of accumulated hours giving the amount of time for each worker and each task, a work distribution sampling, and recommendations. Regular reports are made for management control purposes; followup consultation is provided to the institution.

Only two, FACTS and CSF, report an effort to check for systematic errors in the reporting of data and describe the training for observing and reporting.

There are a few other pieces of literature indirectly related to this method. Progressive patient care is one program developed in an effort to improve patient care and to utilize personnel to a greater advantage. Two writings by Weeks have been included since they are related to staffing. The brochure (A68, Weeks) *The Complete Gamut of Progressive Care in a Community Hospital* describes the research effort carried out in one small study hospital. The other is an anthology of chapters (A69, Weeks and Griffith) each written by a different author or combination of authors. Six chapters are reviewed. Methods for categorizing patients, before and after studies, and methods of determining whether patients are ready for discharge from one unit and for admission to another are considered. These two references provide general information relevant to staffing, including Connor's and Flagle's approaches.

Price's research study and the article by Morrish and O'Connor lend information applicable to some of the elements of a staffing program. Price's study (A53, Price) does not measure nursing care or patient care requirements. It consists of an analysis of staffing practices, the traditional kind, and a cyclical pattern built upon specific variables. Price did classify patients, but not for the purpose of predicting the number of staff required. Following a survey to learn about how staff viewed their assignments and to ascertain local practices in assigning personnel, Price established guidelines and a model for cyclical staffing patterns. Many variables were considered. Cyclical staffing resulted in a number of improvements, among which was a reduction in time spent on staffing and cost. The analysis of hours of nursing care by days of the week showed marked differences in hospitals. There seemed to be a relationship between classification or census with nursing hours. The correlation between these two varied from −.33 to +.98. Price says, "In all the hospitals included in this study, classification of patients for the purpose of adjusting hours to patient need proved to be a waste of time" (p. 123).

Price's approach to cyclical staffing is useful in that it identifies the many variables that must be considered in setting a model for cyclical staffing. It also proposes ways of learning the acceptability of the pattern to staff. It is not a complete approach, however, since it does not include prediction, and does not include other strategies.

Morrish and O'Connor (D32, Morrish & O'Connor) describe a computerized scheduling program developed over a 5-year period at Harper Hospital, Detroit, Michigan. The article includes the advantages, operation of the system, and the problems encountered. Illustrations and printouts are included. The article is useful in picturing one component of a total staffing program.

Methodology Through Operations Research

The Multiple Assignment Technique is computer application to the allocation problem and draws upon operations research methods (A72, Wolfe) (D46, Wolfe & Young, Part II). The research is an extension of that carried out by Connor and Flagle. The result is an estimate of the amount of time necessary to meet the needs for the task complexes and the personnel that best perform it.

The multiple assignment technique requires three sets of data (parameters):

- the classification of patients in three classes: self-care, partial care, and total care;
- the time requirements of a classification of nursing work into 16 "task complexes." These are groups of individual and somewhat independent tasks with easily measurable entities. The categories are mutually exclusive. The "task complexes" are further subdivided into those required by the three classes of patients. They are also distinguished by the nature of the individual tasks or by their requirements for certain levels of training; and
- a cost value attached to each of these task complexes derived by the salary cost and the value of disability cost.

Application of a computer program, utilizing these basic parameters, results in a solution (an estimate) required for staffing a particular mix of self-care, partial care, and total care patients.

Therefore, the multiple assignment method provides guidelines for staffing. Specific tables "Suggested Staffing for Nursing Units during 7–3:30" (A72, Wolfe, pp. 225–9) depict the various combinations of numbers of Class I, II, and III patients, the optimal mix, and the cost for Johns Hopkins University Hospital. The specific steps are (A72, Wolfe, pp. 231 and 232)

(a) The number of individual patients in each patient classification is determined;

(b) The particular array is found in the solution booklet;

(c) The decision is made as to whether the basic staffing meets the model;

(d) If not, reference is made to estimates of expected workload and assignments are made using those guidelines;

(e) If excessive personnel are found, reassignment of these individuals can be made.

The rationale for this method of assignment resides in the premises that patients can be classified into three groups, that nursing tasks can be categorized into task complexes, and that values can be placed on subdivided task complexes. In this approach, nursing work is seen as composed of units or elements varying along a continuum of high knowledge and skill to low knowledge and skill. It is also seen that values are placed on the performance of the work. The workload is visualized as flowing from patients' requirements. No assumptions are made about the sequence of the work. The nursing work required by the three classes of patients is different in distribution of time and skill.

This method is logical and feasible. The problem is obtaining reliable and valid data for the particular institution for which staffing tables are built. There is also a very serious problem of quality measurement, a problem which Wolfe recognized but was unable to resolve.

The question of the validity of the classification of both patients and nursing tasks complexes is based upon face validity and statistical evidence. Wolfe's time studies, although meticulously done, use very small samples. The nursing work analyzed is that of current practice.

Jelinek (D25, Jelinek) [4] reported the development of an activity model and tested it. He was interested in the effect of manipulating several factors associated with staffing: size of nursing staff, organization, policies, number of patients on the unit, type of patient, physical layout of the unit, and supervisor. Multivariate statistical techniques were used to investigate the simultaneous effects of these factors affecting nursing activity. Nursing activities were measured in time, on a per patient day basis, devoted to direct care, indirect care, and nonproductive activity. He used three variables: (a) patients characterized by general condition and length of stay, (b) staff size and mix, and (c) type of unit and number of patients—important variables in determining the time devoted to various nursing activities. Effects of added increments of nursing staff were found to be very much like those in the Iowa Study. Jelinek examined substitutional staff effects such as changes in aides, professional staff, and numbers of students. He found that the greatest contributor to direct patient care is the aide, followed by the licensed practical nurse, the student, and the registered nurse. Interestingly, Jelinek reported that changes in census had little effect upon nursing activity.

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[4] Jelinek's dissertation *Nursing: The Development of an Activity Model* (Bureau of Hospital Administration, University of Michigan, Ann Arbor, 1964) was obtained too late to complete a written review and critique.

In essence, the research by Wolfe and by Jelinek has been drawn upon in the approach by SCALE. To some extent, it also appears in the report by Saren and Straub (A58, Saren and Straub) in the large-scale study of the New York hospitals. In this report, the writings of Jelinek, Connor, and others and the program of CSF were applied. At the Catholic Medical Center in Brooklyn, a control data application of the multiple assignment approach was made using the computer. The head nurse prepared a patient care plan for each patient on the study unit providing the degree, scope, and skill of services needed for quality, not luxury, care. Each patient was also categorized into one of three classes and the amount of care formula applied. The two, one a subjective estimate and the other a formula derived estimate, are then compared. No written report giving the differences between the two appears in the literature. The daily control system employs the computer that stores data describing the work schedule at daily minimum staffing and the patient conditions. Data are then readily available about variation in workload and manpower. Using the concept of basic staff and pool, adjustments are made by assigning additional personnel.

Weir's (A70, Weir) study pertains to variable staffing. He recognized that the problem of daily staffing is a chronic, irritating, and energy consuming one. Large amounts of time are spent on staffing changes, resulting in census fluctuations, particularly in special units, and in changes in patient care requirements. Weir suggests two simulation models that can be used in handling census variations. The simulation models merit attention in that they may be useful. However, solving the problem of variations in staffing requirements necessitates consideration of human factors and the nurse's need for knowledge about the clinical requirements of the patient. Individual members of nursing staffs object to moving from one unit to another. Training for breadth of practice (generalist) is exceedingly difficult especially if the clinical care requirements of the patient are extremely diverse. To keep current in nursing practice requires that the nurse's practice in special care be constant, or at least be repeated at sufficiently short intervals to minimize loss of knowledge and skill. The concept of moving registered nurses, like replaceable parts, may be suitable if the nursing units are similar. If not, preparation for specialization can be achieved by a staff development program. The cost of this education, however, is high.

Weir wisely calls attention to the concept of "nursing failure" days—days in which standards are not met. These are days of both understaffing and overstaffing. Of these two, Weir says, understaffing is the more serious.

Feyerherm (A15, Feyerherm) approached staffing by the examination of patient care loads using a patient classification system of three levels and days in a hospital. He measured nursing work by work sampling using nine minor and five major categories. Care-level sets of equations were established after the values for sets of constants had been derived through the use of the method of least squares. Tests of significance using multiple regression techniques were used to delete terms from the equation. The analysis of prediction equations include the study of the effect of the addition of an individual or an activity. The interesting finding from Feyerherm's work was that there was no substantial evidence for choosing care level variables over hospital day variables in predicting activity patterns. Feyerherm also indicates that changes in population, especially shifts from minimal care to extensive care patients, unless additional staff time is made available, will affect the activities performed by the staff. The change will be in one of three ways: • a reduction of time spent on activities within the minor categories, • by omission of nursing care to selected patients, and • by staff working at a faster pace. In fact, he proposes that when total time spent in communications and standby falls below a certain point, workload limits have been reached.

His carefully designed and conducted study reports the effect of total census and includes staff patterns under certain census figures and workload limits and staffing. His research is highly relevant to nurse staffing methodology. It is an excellent demonstration of the problems entailed in describing a unit of nursing work.

Haussman's (D22, Haussman) application of giving theory to the study of nursing workload was included as an example of the application of operations research to nursing. Unfortunately, the article was not found until it was too late to review the author's basic work. But Haussman's ideas are exciting and therefore included. Haussman proposes a descriptive conceptual model of a burn unit making application of queue discipline, the arrival process, and the service mechanism. He examines unit effectiveness with the intent of proposing alternative staffing. The parameters used in the quantification of the model are • four classes of nurse priority of activities, • patient demands using Connor's classification, • the arrival process, and • waiting time as an index of quality. The article is too brief to make a judgment about its value in staffing predictions; the basic study should be reviewed. But the article is very suggestive. Since experienced nurses recognize that priorities are set in a work situation, the relation of priorities, staffing, and the arrival process is an important question for study.

Comparison of Staffing Methodologies

In a sense, these methodologies represent a gradual increase in sophistication and a greater attempt to obtain a larger amount of reliable and valid pertinent data. A comparison of the four were made along a specific set of characteristics that included: rationale, approach, variables, and feasibility (table 2).

Twelve general statements can be made about the four methodologies:

- Subjective judgment is present in all four, since selection of the nursing unit for workload measurement is made by either individual or group decision.
- Quality measurement of care and performance standards are either weak or totally lacking in all four.
- The basic conceptual models are narrow, in that relatively few variables are considered.
- The impact of architectural variables, organizational variables, and specialization efforts are ignored.
- Prediction of numbers of persons for the major position categories in nursing care delivery systems is not included.
- Reliability of data is questionable since, except for a few reports applying the methodologies, testing for accuracy in reporting and the training of observers, etc., are not proposed.
- Validity of data resides in face validity.
- Two methodologies require consultants.
- All four methodologies are applicable to a variety of health levels and settings.
- Forms used to record tasks are lengthy and confusingly organized.
- The standard time reported for task performance was not documented in the review of literature.
- The classification schemes for most methodologies are drawn from Connor's research.

In chapter 1, criteria for the evaluation of staffing methodology were stated as follows:

- It encompasses enough pertinent variables in its application to produce valid results.
- It utilizes measurement devices that produce reliable and valid data about these variables.
- It is simple, in that it is not time consuming and can be applied by the personnel within the institution with a minimum of consultant and specialized personnel in its application.
- It provides baseline data that can be used in comparative studies within the institution or within a set of similar institutions in the delivery system.
- The cost-benefit can be predicted and is worthwhile. A more costly methodology may in the long run be less expensive in terms of benefit.
- It is responsive to changes in the delivery system, such as the introduction of new positions or elimination of old and the creation of new supporting systems to the nursing care delivery.

Table 2. Comparison of staffing methodologies on selected features

Title of methodology	Basis of rationale	General approach used	Variables considered	Feasibility of approach				Comments
				Reliability of data	Validity of data	Reproducibility of forms	Setting requirements	
Descriptive	Subjective judgment about value of variables	Survey methods: counting, questionnaires	Many. Examples: census data, hospital statistics, financial resources, training, nursing objectives, policies, clinical services	No evidence	Face validity	Some excellent examples in literature: (C7, Gunn) (C14, Paetznick) (D29, Ludwig and Humphrey)	No specific requirements	Broadly applicable but relies upon experience and knowlege of the director, the administrator, and the staff.
Industrial Engineering	Studies and reports drawn from industry. Assumption made that nursing is a composite of tasks or activities.	Industrial engineering	Personnel statistics, nursing care activity and time requirements, work layout, census statistics, work distribution, and workload factors.	Depends upon accuracy of reporting, training programs, and clarity of forms. Checks provided in some reports.	Face validity	Excellent examples in literature: (A47, Mergen) (D4, Bartscht) (D20, Hansen)	Industrial engineer consultants or nursing staff knowledgeable about concepts and tools.	Various types of work measurement used. Nursing staff can make application.
Management Engineering	Research studies of Johns Hopkins Operations Group. Studies and reports from business and industry using industrial engineering and management methodology. Assumptions made that nursing provided represents quality desired, that patient classification is valid, that nursing service demands are stochastically distributed, and that standard time of procedures is valid and reliable.	Industrial engineering methods and system analysis	(a) nursing workload by task frequency and level, (b) standard time for tasks or categories of patients, (c) number of patients in classes, (d) supporting services, (e) personnel levels skill, (f) administration policy and procedures, (g) attributes of quality, (h) personnel data and statistics, (i) age of patient, (j) cost figures.	Depends on accuracy of reporting routine checks not built in, training of personnel for data collection, and necessary clarity of forms.	Face validity, relies on Connor's scheme and its modification.	Examples in literature: (C19, Scottish Health Service, No. 9) (C13, Operational Research Unit) (C4, CASH, Staff Utilization) (C12, Mass. Hospital Association)	Consultant help. No specific hospital setting.	Programs are purportedly designed with these components: (a) identification of performance objectives, (b) function analysis, (c) scheduling of personnel, (d) prediction of staff allocation tables, (e) training of personnel, (f) quality control program, (g) management control information reports.
Operations Research	Studies and reports from industry. Operations research by Connor, Wolfe, and Flagle. Same assumption as above.	Operations research: mathematical allocation and situation model; queuing theory. Industrial engineering and system analysis	(1) classes of patients, (2) 16 task complexes, (3) cost values.	Evidence presented: depends upon accuracy of reporting.	Face validity: relies upon Connor's classification.	Examples in literature: (A72, Wolfe) (D46, Wolfe, and Young, Part II)	Computer: consultant help.	Application not widely observed in the literature. Quality measurement recognized as not present.

Application of these criteria leads to six conclusions about the suitability of the present set of four methodologies. Although the intent of the methodologies is admirable, all are weak. The measurement they use should be more explicit, should be rigorously applied, and should be tested prior to use. More variables are required to produce valid results. The number of variables is small. Consultant help is required for two methodologies, and this help is undoubtedly expensive. The management engineering approach provides baseline data for comparative purposes. There is no evidence that one methodology is more responsive than another to changes in the delivery system.

Chapter 5

Problems and Issues

The perplexing questions about staffing requirements and nursepower usage arise from several sources. The number of variables with which one must deal is almost incomprehensible and, for the most part, the nature of these variables appears to defy description and quantification. There is little agreement in the literature on the nature and characteristics of some very evident variables: nursing practice, patient needs, quality of care and control, complexity of care, intensity of care, and levels of practice. As indicated in chapter 3, the amount of knowledge about some variables thought to be relevant is very limited.

For purposes of discussion, the problems and issues relating to nurse staffing are organized around four major topics: models of nursing care delivery, measurement of quality, measurement of patient requirements, and measurement of nursing activity.

Models of Nursing Care Delivery

There is no well developed model of the nursing care delivery system. The term "model" is used, in this sense, to refer to an analogy of the pattern of relationships observed in a nursing care delivery system. Nadler and Sahney (D33, Nadler & Sahney) have made a fine beginning and some mathematical models were found in the literature; for example, those proposed by Connor, Jelinek, Haussman, Weir, Barr, and Wolfe. But the number of variables included in these mathematical models is relatively few. The writings of Howland, Levine, Wooden, Smith, Kakosh and Rieter, Aydelotte, the Illinois Commission, Christman, and Georgopoulos are commendable as are several others, as well as the research findings pertaining to specific variables that lend themselves to further analysis for conceptual building.

The problems of model construction are exceedingly troublesome. First, there is the question of setting the boundaries of the model. Will the boundaries be those of the nursing unit, as they are in Jelinek's and Wolfe's writings, or will they include parameters beyond the hospital, as implied in the Illinois Commission study and Levine's excellent study of Federal and non-Federal hospitals? Second, how many variables can be adequately explained and managed in the model? The problem of identifying relevant variables and eliminating nonrelevant ones is extremely complex, especially since knowledge about the variables and their relationships is vague, measurement of some of the variables is almost impossible, and the writings are restricted to a selected few. Nurses who have been in the real work world would undoubtedly identify three groupings of variables: • selected factors external to the hospital influencing nursing delivery, such as size of nursepower pool, financial resources of the clientele, and health status of the personnel; • components of the hospital system: patients, medical staff, management, financial resources, supporting services, traffic patterns, nursing leadership, qualifications of staff, staff productivity, and staff stability; and • independent factors that can be used to determine the effectiveness of the system, such as patient's satisfaction, patient's behavioral changes, and efficiency of services.

In view of the trends and issues in the health delivery system, described in chapter 1, and the redirection that is becoming increasingly evident, the development of new models of nursing care delivery systems is urgent. These systems should reflect the innovations in roles that are becoming more apparent.

In none of the literature was there a description of an exciting, innovative, conceptual model for use in the development and examination of staffing methodologies. Some good ideas are found in some writings. However, thoughtfully conceived and carefully written descriptive models are greatly needed.

Measurement of Patient Care Requirements

The second major problem confronting staffing methodology development is the inability to identify in advance, prior to prediction, what the patient or a group of patients is entitled to receive as the product, *nursing care*, for which he is paying. The fundamental reason for assembling a staff is to take care of the patient.

Identifying the components of care a patient must receive is essential to any staffing methodology. The arrival and discharge times, the hourly and daily variation in the patient's requirements, the medical programs and scope of medical practice, the training programs, the problems of measurement of quality, and the lack of an operational definition of care itself make the problem of measurement formidable.

The assumption made by the present methodologies is that, at the time of survey, what is provided for the patient is essential. Therefore, the present classification systems, Connor's included, have examined physical elements of care or activities performed and have accepted them as requirements for care, without sufficient thought given to the question "what does the patient *truly* require?" There is no empirical evidence that there is validity in making the assumption that what the patient is getting is what he requires for recovery. In fact, there is some evidence that what he is getting is given as a matter of routine and ritual and not for therapy. The majority of patient classification schemes reflect specific nursing tasks, a number of which arise because of medical order and acuity of illness. The schemes do not reflect emotional needs, orientation of the patient, the instructions needs, and comfort, other than through the process of providing physical care. A few have attempted to include these items, however. But no scheme, for example, has been built upon the nursing problems of the patient, although several investigators began with this intent. Yet experienced practitioners in nursing can set a priority ranking of nursing problems and combinations of problems that would reflect both amount of time and professional knowledge base and skill required for performing the care to solve the problem.

If one were to assume that the present patient classification schemes are valid, a second problem exists. Except for Mainguy's (A46, Mainguy, et al), the patient classification schemes have not been rigidly tested. They have not been used in a variety of different settings with the intent to learn how reliable the schemes are when applied. Connors' scheme was established in a large medical center and only one formal test of it was found in the literature. Is it equally applicable to medical-surgical patients in a small community hospital? What is the reliability between raters?

Measurement of Nursing Activities

If properly used, the various methods for studying nursing work are feasible, reliable, and simple. The problems are those of sampling, of selecting model units for survey, of establishing categories that represent major nursing function, and the limitations inherent in the use of the method. It is the assumption that what is being observed is desirable and is questionable, plus the fact that the categories often do not reflect planning and thinking time required if nursing is perceived as having an intellectual base. The selection of a model unit for study to make staffing prediction is critical. The management engineering methodologies indicate that a subjective judgment is made by an advisory group composed of nurses and hospital administration. The impression, however, is that this judgment is not based on hard data reflecting the achievement of specific quality of care and evaluated by well defined criteria.

The second problem in nursing measurement is grouping the tasks or categories into task complexes for further research on staffing methodology. It is extremely difficult for some nurses to conceive that performance of personal services to patients may not be necessary, feasible, or economical. The use of expensive professional nursing time for simple tasks, repetitive but personal for the patient, is overuse of skill and talent. But this statement is unacceptable to many nurses. These nurses state that use of auxiliaries depersonalizes nursing care, that these personal tasks may serve as vehicles for nursing action, and that the elimination of personal care from the registered nurse's repertoire of duties is unwise. The crux of the argument is not whether it is personal or not, but what is the knowledge and skill requirement for its performance and how does this affect the patient's recovery? It is uneconomical for registered nurses to spend time on giving care to patients that is nontherapeutic. The question is, What are registered nurses doing for patients that no one else can provide? What are we not providing?

Measurement of Quality[1]

The ultimate test of a staffing program, or any nursing activity, is the progress of the patient, not the quality of performance of the nursing staff, the appearance of nursing units, or the completeness of records. The amount of time spent with a patient, the skill with which a particular procedure is performed, the number of times a patient receives a procedure, the number of times the patient has contact with the nursing staff, the flow of communications, the results of a nursing audit, or even the patient's satisfaction are inadequate criteria for the evaluation of the quality of nursing care the patient has received until the *relationship between these factors and the progress of condition of the patient has been established.* It has generally been assumed that a positive relationship exists between certain accepted nursing practices and the patient's condition. The evidence to support most of these assumptions is meager, particularly when applied to a total nursing unit rather than a select group of patients.

The major reason that the relationship between nursing activities and the patient condition has not been generally determined may be due to the problems involved in the development of patient condition criteria; i.e., identification of what one must observe in, on, or around the patient to determine whether the nursing care he is receiving is beneficial to him for his present and future status. It is time that the question of criteria construction be squarely faced.

Since the goal of any nursing care program is the achievement of certain conditions in the patient, it would seem imperative that adequate criteria must be stated in terms of what is realistic for and significant to the group of patients that comprise the population the agency serves. Except for differences related to the amount of service considered appropriate for the particular hospital to provide, there should be little disagreement as to what constitutes quality of care if the criteria are based on knowledge of the condition of the patient, effects of various treatments and approaches, probable prognosis, and a realistic plan for what is possible for the particular patient. Differences in criteria must be based on the particular kind of problem, the resources available, and the state of our knowledge about the problem.

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[1] The author wishes to acknowledge that this section is the contribution of Marjorie A. Moore, Ph.D., R.N., Associate Director, Personnel and Staff Development, University of Iowa Hospitals and Clinics, Iowa City, Iowa.

Nursing is a complex activity and must involve a variety of approaches since it deals with a variety of nursing care requirements. To develop an instrument that is sensitive enough to reflect the effectiveness of the multiplicity of activities, one must set up the criteria in terms of specific results to be achieved. This is not to say that one must wait until a patient enters before one can develop the criteria, but rather that one has criteria that have been developed for groups of patients based on knowledge of the factors that affect them.

In the development of criteria one may start with general objectives that are held for all patients—these are necessarily general and broad so that they can be used as a guide for the department. They might be considered in terms of what any patient who comes to the institution is entitled to receive. The fact that they must be general does not mean that they are not, at the same time, realistic. An objective that states that the patient's basic needs will be met is unrealistic and meaningless. An objective that states that "the patient's pain and discomfort are minimized" [2] is one that is a reasonable expectation for any patient and that would likely be incorporated into the goals of any nursing unit. In this form, it is much too general to apply to a specific situation and needs to be defined operationally for groups of patients and for stages of illness.

To put the objective in a form that can be used for evaluation of the daily nursing activities it is necessary to ask, "What do I look for in the patient to tell me that the pain has been minimized or that the conditions are present that will minimize his pain to the point that it is possible to do so with this patient?" With some patients complete freedom from pain is the objective. With others, dulling or reduction in the intensity of the pain may be all that can be achieved within the limits of safety for the patient and of our knowledge about pain relief. With a subjective symptom like pain, the criteria for freedom of pain or reduction of pain might involve response to a question put to the patient. When asked, the patient will state that he is free of pain or that his pain has been reduced. This might be one criterion for the achievement of this objective. Other criteria would be used to evaluate the patient's comfort. A clean, dry, wrinkle-free bed would be a necessary condition to maintain a patient's comfort, so it could also be included as a criterion even though it is not the final result but a substantial necessary condition for the final result as seen in the patient.

One of the greatest problems associated with the development of criteria for evaluation of achievement of nursing care objectives is the selection of those observations that provide the most useful information. It must be remembered that criteria for evaluation of nursing care are useful only if they provide the information that will help nurses continue to improve and make more effective and efficient the care that is given to patients. So it is important not to confuse the evaluation of the method with the results it is to achieve; that is, to assume that if the nursing procedure were done, the results were achieved. On the other hand, nurses do not want to ignore the conditions in, on, or around the patient and check only the final outcomes expected, or the problem will develop before they can provide the necessary modifications.

To illustrate these points, consider the patient who has had an indwelling catheter inserted and who does not have a urinary infection. Periodic examination of the urine in the collection container would provide information about whether the infection was present. To make sure that the conditions are favorable for prevention one must also observe other conditions, such as the arrangement of the tubing, to make sure there were no conditions that would interfere with the continuation of the infection-free state. To know that the patient had not already developed an infection would not be sufficient. If nurses are to provide quality care, they must evaluate the extent to which the conditions are favorable for maintaining the condition.

Since such items as the unkinked tubing or examination for free drainage are considered criteria for the evaluation of the quality of nursing care, would it not also make sense to include a criterion to the effect that the catheter has been inserted under sterile conditions? The discrimination of what is a criterion for evaluation of the activity and what is a statement of the action of the nurse is a difficult one. A principle that might be used in distinction is in the availability for observation. It is not possible to observe every nursing activity that is provided to the patient.

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[2] Department of Nursing, University of Iowa Hospitals and Clinics, *Policy and Procedure Manual* (in press).

The use of sterile techniques when performing catheterization is a standard of *performance*, but the evaluation of performance standards is related to the degree to which the standards produce certain results in, on, or around the patient. One might at a given time decide to observe a nurse performing a task to determine whether she meets the *performance standards*. But the *development* of the performance standards must be based on certain results to be achieved, and that can only be determined from knowledge of what the results should be and what observations must be made to determine whether the results have been achieved.

To obtain the most useful information, it might be necessary to obtain certain information that is not observed in or on the patient nor on his immediate environment, but provides the data for necessary judgments. Sometimes information may be available only through observation of records—adequate intake recorded—the patient received 3,000 cc of fluids; etc. Criteria for evaluation of preparation for X-ray may be based on whether the X-ray could be completed in one appointment time. It is important to identify what is the result desired and what will give the information about whether it has been achieved.

Another problem that makes the selection of criteria to be used for evaluation difficult is the determination of the extent of the responsibility of the nurse for what happens to a patient. How can one write criteria that allow for all the variables that might influence the results? Is it not possible for a patient to develop an infection even though the nursing care is adequate? How can one use a criterion that a surgical wound is free from infection when there might be reasons that infections occur other than the nursing care. The solution to this dilemma resides in the position the nurses take as to the purpose of the evaluation criteria. If one is using such criteria as an absolute for placing blame or for achieving certain ratings of nursing care, it would indeed be unfair to have such uncompromising criteria. If one will condemn the nurses when a patient has developed an infection because of forces over which she would have no control, she would be unlikely to set up a situation which would place her in this position.

If we take the position that nursing criteria are used to provide us with information for the constant improvement and processing of nursing care, it is important to have criteria that demand the most from the nurses. It is necessary to find an intelligent compromise between criteria that foster constant study of nursing to find solutions to problems and those that are unrealistic in the particular setting. To prevent new infection in a surgical patient is a realistic goal. If infection develops in spite of what has been adequate nursing care for other patients, the problem should serve as a basis for investigation of the factors and their modification, not as a basis for low-rating the present care, or as an excuse for inaction.

Criteria are most useful if they are stated in terms of what is acceptable instead of in terms of the absence of the unacceptable. The question to be answered is, What must be observed to determine that the patient is progressing as he should and what must be observed to predict that he will continue to progress as he should? Criteria for promoting quality of care must be in terms of that which is desirable rather than absence of undesirable states, and if we are trying to achieve a certain state we need to be able to recognize it when we have achieved it.

To summarize, criteria for the evaluation of nursing care should embody the following characteristics:

- They are stated in terms of results to be achieved with the patient, not in terms of actions of the nurse.
- They describe the desirable conditions to be observed if the care is as it should be.
- They provide the best information available to assess the present status of the patient as well as the potential for future welfare.
- They are the criteria that can be demonstrated to be the most crucial to the welfare of the particular group of patients.
- They are realistic, but they are rigorous enough to encourage continued study of the nursing process for improved methods.

The measurement of nursing care quality and the establishment of performance standards cannot be accomplished until nursing practitioners and nursing practice leadership give attention to criteria development. It is evident from the ongoing discussion that criteria development resides in individuals with superior nursing knowledge. The primacy of the problem is apparent. The questions are, Where are the practitioners who can develop and state criteria? How can the criteria be built into an ongoing program of quality measurement? What modifications are required of the ongoing program in order to build scales or indices that can be used at specific points in time for research purposes?

Summary

Although the problems and issues reviewed are almost overwhelming and the interrelatedness is great, an attack on the problems has been made by some authors and investigators. However, in order to make great programs, specific action should be planned and a concrete effort made to resolve some of the fundamental problems.

Chapter 6

Recommendations and Hypotheses

The reviews and critiques of the literature have provided knowledge about staffing methodology development, have given insight into ways of solving problems of staffing, and have been highly illuminating in that they point up the need for research in questions relating to staffing. Consequently, specific recommendations and hypotheses are proposed.

Recommendations

Seven specific recommendations are made. *First,* nurses knowledgeable about nursing practice and intimately acquainted in the real work world of nursing care delivery systems should be sought, encouraged, and supported in the development of conceptual models of the nursing delivery care system. This is no easy task. But progress in the acceptance of nurse staffing methodology and research on nursing delivery will be delayed until there is superb nursing impact. These individuals should be encouraged to seek out and collaborate with individuals from the fields of engineering management and operations research.

Second, carefully designed research studies testing present classification schemes, Connor's, Mainguy's, Barr's, and Chaska's (drawn from Dunn), should be conducted. These schemes are already in use. Their validity resides in the fact that their development included nurses. Three are based on highly objective data. But since limited evidence is found in the literature that these schemes are providing reliable data, carefully controlled tests should be made of the schemes in a variety of hospitals. The external factors that influence the character of the patient population should be identified as fully as possible.

Third, patient classification schemes built around nurses' perception of care should be built and tested. These schemes should be based on reasonable care requirements as nurses see them. The present schemes do not reflect omissions of care, which may be serious; on the other hand, omissions may not be important. However, the recommendation is that proposed schemes for the classification of patients indicating nursing loads be developed by knowledgeable practitioner nurses, these schemes to be established around nursing problems and reflecting nursing priorities; nursing knowledge, and skill level. The scheme should lend itself to computerization. It should be based on data used by the nurses in assessing patient care requirements.

Fourth, since the effect of improved supportive systems upon nursing staff requirements has not been well documented, controlled studies of the effect of improved delivery and retrieval systems and placement of patient care items, equipment, and supplies should be conducted. The questions are: holding quality constant, what is the effect of improved availability of work materials and tools for patient care upon the size and kind of nursing staff required? What is the effect upon cost?

Fifth, a concentrated attack on measurement of quality must be made. From the review, the impression is that attempts are too global. Except for a few instruments, not much is available to assist the director of nursing and the hospital administrator in making estimates of quality. The evaluation must relate to the effect on the patient. Therefore, different sets of criteria may be needed since the patients in the hospital vary. The patient variation is dependent upon the purpose for his being in the hospital, the progress he is making, and the course of his recovery. Development of these criteria will require the involvement of expert nurse clinicians.

Sixth, guidelines for use of the four specific methodologies should be developed; these guidelines should state the rationale upon which each is based, the variables studied, the limitations of each, the appropriate use of the methodology, the component strategies, and the procedures, and it should include examples of well developed forms, reports, guides for use of allocation tables if included, and the like. The value of the methodology as well as the hazards of its use should be stated. The importance of concurrently studying supporting systems, or even preceding the analysis of nursing with a study of these, should be emphasized. Proper utilization of supporting services and expectations of adequate service from them should be made clear.

Seventh, guidelines for new methodologies should be explored, greatly enlarging the variables considered. The variables and methodology could well be a modification of the works by Levine (A40, Levine), Barr (C13, Operational Research Unit, No. 9), and Illinois Commission (A29 and A30, Illinois Commission on Nursing). The methodology should be based upon a carefully described conceptual model of nursing care delivery. It should provide guidelines that will take into account providing for omissions of care as well as eliminating repetitions of care, the organization of the work of nursing personnel, and the sequence of its delivery.

Hypotheses

Fourteen hypotheses are proposed for further testing:

- An increase in differentiation of nursing function between the technical level and the fully professional level will result in an increase in quality of nursing care and a reduction in cost of nursing care to the patient.

- Holding quality constant, an increase in supporting services to nursing will increase the amount of nursing hours per patient, but reduction in numbers of nursing personnel will not be related to increase in supporting services.

- The time sequence of technical and clinical nursing activities is related to the recovery pattern of the patient.

- In episodic health care centers, the priority of nursing activity provided for the patient is related to the maintenance of the physiological functioning of the patient.

- A direct measurement of quality of nursing care is the amount of time given to *surveillance* of the patient by the registered nurse.

- A direct measurement of overload of the nursing staff is the amount of *waiting time* required by the patient.

- The number of patients for whom one nurse can evaluate, plan nursing care, and direct and supervise other personnel is related to the diversity of nursing problems within the patient population.

- An indicator of nursing load is the surveillance time requirement of the patients.

- Factors influencing nursing workload variation are characteristics of the arrival process, the sequence of medical or surgical intervention, and the discharge process.

- The optimal mix of nursing staff for giving care to the patients is related to the type of medical or surgical intervention provided him.

- Holding quality constant, an inservice education program providing knowledge for practice will not reduce amount of staff required.
- Holding quality constant, inservice education directed at leadership in management will not reduce amount of nursing staff required for quality care.
- An increase in educational qualifications of personnel alone will not result in an increase in quality.
- The amount of nursing staff hours required for *technical* care for a group of patients is directly related to the number of medical staff and the number of training programs being conducted around the group of patients.

SUPPORTING DOCUMENTATION

Introduction

This section contains three parts: • a brief introduction, • the review and critique of the literature, and • the glossary of terms used in reading and describing the literature.

The literature has been organized into four sections: A. Books, Monographs, Research Reports, and Theses; B. Reports and Term Papers; C. Guides, Manuals and Pamphlets; and D. Periodical Literature. These are defined as follows:

Book or Monograph. A set of printed sheets of paper, bound between covers, forming a volume, usually published by a university or commercial press.

Research Report. The formal statement of a research investigation, in which there has been a formal statement of purpose or question and the intent is to provide new knowledge for the world at large. It is an account of the investigation for submission to a press or to a body to whom it is accountable for funding.

Thesis. A standard written requirement in many colleges and universities for postgraduate degrees, which is the account of the student's investigation into a problem or project selected by him, his chairman, and the thesis committee.

Report. A record or an account of the transactions, in more or less detail, of the search for answers to problems in one particular setting, reflecting more problemistic search than through a rigorous investigative effort.

Term Paper. A written paper usually prepared to meet a specific course assignment and usually more limited in scope than a thesis; as a rule, the investigation is made in the library and seldom involves laboratory research or field study.

Guide or Manual. A book or pamphlet that explains, outlines, or gives a practical approach to resolving problems on some subject. The outline may include exhibits of materials that are helpful in describing or explaining the approach.

Pamphlet. A brief outline, treatise, or essay on a subject, often of current interest, printed or published, without a binding.

Periodical Literature. Written material appearing in publications, such as magazines, that are printed at fixed intervals.

The review reflects the type of literature for the first grouping, "Books, Monographs, Research Reports, and Thesis." The review is organized, if the source document permits, into such units as:

Purpose, including rationale, objectives, and hypothesis
Method, sample, instruments, and procedure
Findings
Conclusions
Summary

The review of the other types of literature varies depending upon the content of the piece. If the piece of writing draws upon a research study, or if it employs a problemistic study approach in a single situation, and if it gives sufficient information, the same format is used. If it does not, a general description with no headings is provided.

Each piece of literature falling into the section, "Books, Monographs, Research Reports, and Theses," has been examined in relation to its respectability as a research study and to its meeting eight specific features of criteria. These eight are:

- the significance of the problem to the field of nursing and in particular to nurse staffing methodology,
- the theoretical framework of the investigation,
- the aspects pertinent to the measurement of nursing care requirements and prediction of nurse staffing needed,

- the relevance of the various research designs to the overall problem associated with nurse staffing,
- the use of specific innovations and adaptations of other approaches,
- the characteristics of the study and variables not significant to staffing methodology,
- the tools and instruments most easily translated into present day use, and
- the feasibility of applying any portion of the research study to staffing methodology.

The literature that does not meet the definitions of books, monographs, research reports, and thesis has been submitted to the same examination. However, it is recognized that many pieces will not provide enough detail to comment on the full set of criteria, other than negatively, since the pieces have not been designed as scholarly undertakings in the first place. Therefore, these items of literature have been read for clarity of expression and for identification of ideas that may be used in practical approaches to the question of nurse staffing.

Each piece of literature is identified as fully as possible. Dates have been found missing and often no publisher or source is given. However, all available identifying information is included.

The literature review precedes the critique of it. This arrangement enables the reader to familiarize himself with the content of the study prior to reading the evaluation of it.

The glossary comprises the second part of this section. In the review and critique of the literature, extensive use of research terminology is avoided in order to serve a wide variety of readers. The glossary gives a definition of terms used in this report and in the literature reviewed.

The glossary has been divided into two parts. The first deals with Research Terms, divided into General Research Terms and Operational Research Terms. The second division of the glossary gives terms applied to Health Care and General Terms. Many of the definitions are drawn from standard references and these are given at the end of the glossary. Each definition refers to its source or sources. If the definition is an exact quote from a standard source, quotation marks are set around the quote. If the definition is an adaptation or modification of a definition, quotation marks are omitted but the source of the definition is indicated.

Reviews and Critiques

A. Books, Monographs, Research Reports, and Theses

A1. Abdellah, Faye G., and Levine, Eugene. "Effect of Nurse Staffing on Satisfactions With Nursing Care." ***Hospital Monograph Series No. 4. American Hospital Association,*** **Chicago, Illinois, 1958.**

Review

Purpose.—"The purpose of this report is to present the findings of a study to see whether differences in numerical staffing of nursing personnel in hospitals actually affect feelings of inadequacy of nursing services of the recipients and providers of these services."

Rationale.—Even in hospitals where the average daily hours of nursing care available per patient was one and one-half to two times as much as recommended practice, these hospitals reported that more nurses were needed to provide satisfactory nursing service. The problem seemed to center on the feeling of inadequacy of nursing services rather than on the shortage of nursing personnel.

Feelings of inadequacy can originate from patients and their families, nurses, and administration. The administrator's feelings of inadequacy may be attributable to adequacy of staff, utilization of nursing time, or difficulties in personnel recruitment. The nurse may have feelings of inadequacies because of competing tasks taking her away from the bedside. The patient may have feelings of inadequacies of nursing service because of one incident. Real causes for stress situations blamed on nursing shortages include: patient's need for continuous emotional security and information, low staff morale, poor utilization of nursing, insufficient preparation of personnel, and poor layout of hospital.

Sample.—The sample consisted of data from 20,000 patients and personnel in 60 large general hospitals. Of the total population of 7,000 U.S. hospitals, 450 were between 100 and 500 beds, non-Federal general hospitals and within a limited geography of seven States. Sixty hospitals were selected on the basis of a stratified random sampling procedure. Twenty-seven basic sampling groups were developed on the basis of hospital size, ownership, and hours of nursing care.

From the 60 sample hospitals, 20,602 checklists were received. The final count of usable questions was 8,660 from patients and 9,480 from personnel in 57 hospitals. Sixty-one percent of the patients were female. If obstetrical patients are excluded, 45 percent of the patients were female. One-half of the patients were in private or semiprivate accommodations.

The median age of professional nurses was 30. Thirty-eight percent were employed in positions above staff level and 52 percent were married. More than half of all hospital employees were employed for less than 5 years.

The patients and personnel in the hospitals participating in the study were similar to patients and personnel in all general hospitals in the country according to the 1951 study (Louis Block, "Prototype Studies." *The Modern Hospital*, June 1953).

Among the 57 hospitals, the total average daily hours of care per patient available ranged from 2½ hours to 6.2 hours. The average daily number of professional hours ranged from ½ hour to 3¾ hours per patient.

Instruments.—Criteria used in developing the instrument to measure feelings of inadequacy were: (a) the instrument should include a report of specific incidents occurring on patient units and involving omitted or unfilled aspects of nursing care; (b) the instrument should place little reliance on the memory of the respondent; (c) the instrument should yield valid and reliable numerical scores; (d) the instrument should encourage frank responses and enable the respondent to feel that his contribution would improve patient care; and (e) the administration, scoring, and tabulation of results should be simple and straightforward.

The final instrument consists of two checklists, one for patients and the other for personnel. Each contains 50 statements of events that represent omissions in nursing services. Scores could vary from 0 to 150 since each event could be checked from one to five depending on the importance if the event happened. Statements of omissions in nursing care written by hospital personnel were subjected to vigorous field trials for 2 years. With the use of the Q-sort technique to weight the omissions, the instrument met the established criteria. The development of the instrument is further described in *Nursing Research*, February 1957 issue.

Procedure.—Each hospital elected a full-time member of the nursing staff to serve as a study director and each of the 60 hospitals was visited by a study team. A study day was assigned to each hospital. On this day as many of the patients as were able to respond and as many of nursing and medical personnel plus hospital and nursing administrators as available were asked to fill out the checklists previously described. The study days were spread over a period of 3 months although no study days were on weekends and only eight of the hospitals held study days on Mondays and Fridays.

Regression equations tested the relationship between hours of nursing care and feelings of inadequacy of nursing services as a means used by scores on the checklist. These data were grouped with other hospitals having the same hours of nursing care, patient census, and ownership. The occurrence of the 50 individual events was tabulated for each individual hospital.

Results.—The results were analyzed in terms of range of response and use of multiple regression analysis.

Patients had the lowest scores (indicating most satisfaction) while nursing administrators and head nurses had the highest scores (including least satisfaction). However, patients were indicating omissions in care that occurred to them personally, whereas administrators and head nurses were concerned with omissions in care to a number of patients. One-third of all patients felt care was completely adequate (scores of 0). Another one-third scored less than 15, which is only 10 percent of the highest possible score of complete dissatisfaction. Only 1 percent had scores higher than 75. Scores of 36 professional staff nurses ranged from one nurse with a score of zero to six nurses with scores greater than 75. Students represented the smallest proportion of respondents who reported no unfilled needs.

The results of the multiple regression analysis of hours and feelings of satisfaction showed that (a) scores on the checklists of obstetrical patients, doctors, nursing aides and orderlies are not related to either total or professional hours available in the hospital; (b) patients other than those on obstetrical units were more satisfied with nursing services where the hours of professional nursing care were higher. The number of total hours did not influence feelings of inadequacy; (c) nursing personnel, (especially staff nurses and with the exception of aides and orderlies) were more satisfied with nursing services when the total amount of nursing care was high; and (d) there was a strong relationship between professional hours available and patients' feelings of adequacy and total hours available and staff nurses' feelings of adequacy.

The "ideal" staffing pattern is 4.7 hours total nursing care per day of which 2.5 hours are provided by professional nurses and 2.2 hours by other nursing personnel. These figures are computed by averaging the hours in the hospitals with the highest satisfaction scores.

Subscores on the checklist (dietary needs, rest needs, and therapy needs) were computed to determine the effect of nursing hours on dissatisfaction with specific nursing services.

There is no indication that the type of hospital ownership was related to feelings about inadequacy of nursing services. In the hospital with low and median hours, dissatisfaction increases as the size of the hospital increases.

Summary.—In hospitals with higher professional nursing hours, nonobstetrical patients reported fewer unfulfilled needs. Most of these hospitals had schools of nursing. There was no relationship between total nursing hours and numbers of unfulfilled needs reported by nonobstetrical patients.

Numbers and kinds of nursing hours approximated the same proportion of unfulfilled needs for obstetrical patients.

There was no relationship between hours of nursing care and the number of unfulfilled needs for obstetrical patients.

There was no relationship between hours of nursing care and the number of unfulfilled needs reported by doctors, aides, and orderlies.

Administrators, supervisors, staff nurses, student nurses, and practical nurses reported fewer unfulfilled needs of patients when total nursing hours were higher than professional nursing hours.

The data suggest that patients and personnel in larger hospitals had more intense feelings about inadequacies of nursing services.

Unfulfilled dietary needs were not related to hours of nursing care for any category of respondent. Unfulfilled therapy needs were related to professional hours according to patients. Total nursing hours were related to unfulfilled therapy needs according to most nursing personnel.

Critique

The feelings of inadequacy about nursing care delivered to patients represent a widespread phenomenon about which much is said but about which little investigation has been done. This study, a classic, is the first major attempt, in a sense the only attempt, to describe the phenomenon by systematically isolating one variable for research.

The theoretical framework of the study includes the background of the problem giving rise to the research, a description of incidents and comments in the field supporting significance of the question, and the development of a mathematical model to explain the relationship between the independent and dependent variable. The text of the study does not include a description of the literature search to ascertain if any aspect related to the study had been conducted prior to this attempt. There is no reference to psychological literature reviewing the development of feelings of satisfaction or dissatisfaction with products, or the relationship between stress, frustration, and psychological strategies employed to meet stress or the measurement of any of these.

The design of the study is sound. The instruments were submitted to rigorous field testing. The statistical treatment was appropriate. Findings are based on data and the conclusions cautiously drawn. The authors state the limits of their findings and advise judicious use of them. The great value of the study lies in the hypotheses that are generated. The hypotheses are stated in such a way that they can serve as propositions for testing.

A2. Alfano, Genrose J.; Levine, Herbert S.; Rifkin, Harold; and Goldman, Martin. "Longitudinal Effects on Cardiac Patients in an Experimental Health Facility." (NU 00308) Montefiore Hospital and Medical Center, Bronx, New York, 1971.

Review

The Loeb Center for Nursing and Rehabilitation at Montefiore Hospital is an 80-bed facility offering a program of comprehensive, intensive nursing care provided solely by registered nurses. It is hypothesized that this program results in a reduction of the patients' need for intensive care. The nursing care is organized about the requests and concerns of the patients and modified in relation to the disease entity. The per diem cost of this new form of health care delivery was half that of the general hospital.

Purpose.—The purpose of this study is, "To determine if patients exposed to the Loeb Center Program experience certain desirable outcomes following hospitalization more frequently or sooner than patients without such exposure. Indices of individuals of postdischarge outcomes are morbidity, mortality, medical care requirements, employment, household and community activities."

Sample.—The study group consists of patients with clinical, EKG, or laboratory evidence of an acute myocardial infarction, coronary insufficiency with or without complication of congestive heart failure. These patients represent one quarter of the admissions to Loeb Center. A total of 577 patients with coronary artery disease and no prior stay at Loeb Center were referred, using a random assignment such that for every two patients admitted to Loeb Center, one patient was to remain in his existing Montefiore Hospital location until discharge. The patient's potential allocation is unknown to the responsible physician. The random assignment procedure was known only by the project staff who were personnel from the Hospital's Department of Biostatistics. Three hundred sixty-five patients were assigned to the Center; 212 were assigned as controls. The participant rate was 95 percent for Loeb assignments and 86 percent for Controls.

Procedure.—Each subject undergoes a detailed personal interview, a medical history, a comprehensive physical examination by the project physician, a chest X-ray, and an electrocardiogram. This procedure is repeated at discharge and 1, 6 and 18 months after discharge. The response rate of all patients still alive the month after discharge was 82 percent among Loeb patients and 74 percent among Controls.

Results.—The Loeb Control respondents were dissimilar in terms of age, length of hospitalization, and length of hospitalization prior to the study.

The data were adjusted to account for differences in group composition with respect to age and length of hospitalization. The mortality rate at 1 and 6 months postdischarge is slightly more frequent among Loeb participants. A larger proportion of Loeb respondents returned to work within 1 month of discharge (10.0 percent vs. 2.8 percent). At 6 months the rate of employment was 68.5 percent of the 122 Loeb participants; 59.3 percent of the 72 Control patients. A re-admission to the hospital with 1 month after discharge was 8.6 percent for Control and 3 percent for Loeb patients. The rehospitalization rate at 6 months was 15 percent for Loeb and 14.19 percent for Control patients. Admission to a nursing or convalescent home within 1 month of discharge was 10.19 percent for Control and 2.4 percent for Loeb patients. The data have not been examined and assessed on the basis of total amount of institutional care received. More than one visit to a physician was made by 52.4 percent of patients from Loeb and 51.7 percent of Control patients within 1 month of discharge. The percentage rose to 87.5 percent for Loeb patients and 94.2 percent for Control patients within 6 months of discharge. Care received at home from nursing personnel, therapists, and housekeepers was received at somewhat the same levels by Loeb and Control patients.

This preliminary review of data suggests that patients hospitalized at Loeb Center achieve earlier physical, social, and vocational rehabilitation. However, a more indepth study is in process.

Critique

This study is only indirectly related to the question of nurse staffing. But the study is a highly significant one. The Loeb Center for Nursing and Rehabilitation at Montefiore Hospital is a facility staffed solely by registered nurses. Therefore, results of a carefully designed and controlled study showing favorable results for the Loeb center practice effects does raise questions about the use of personnel levels in staffing and the traditional pattern of organizations in nursing services.

The investigators report their study in a general way. Many details are lacking in this paper and it is impossible to comment on the stringency of the research. However, this report is helpful in that it suggests outcomes which are long range outcomes that can be used as criteria for staff effectiveness. It also calls the readers attention to a report forthcoming that will be examining other features of outcomes. Hopefully, the research will be described in greater detail.

A3. Amidon, Roger Lyman. "Organizational Roles of a Clinical Nurse Specialist." Unpublished Master's Thesis, University of Iowa, Iowa City, Iowa, June 1965.

Review

Purpose.—The purpose of this thesis is to combine pertinent data, professional opinion, and the author's assessment to provide guidelines in determining what is a clinical nurse specialist and what effects might development of this role have on patient unit organization.

Method.—The nursing personnel requirements are examined. The focus is specifically upon registered nurse supply and demand.

The increasing complexity in the patient unit therapeutic milieu is presented in terms of the technological processes in equipment and technique for both physicians and nurses. There is a growing awareness of the sociocultural aspects of illness. The increased division of labor is leading us toward greater specialization.

There are two major reasons for interest in formal and informal organization of hospitals. First, the hospital concept has progressed from the terminal care wards of the Middle Ages to a highly diverse and complex structure. Douglas M. McGregor in "New Concepts in Management," *Technology Review*, Vol. 63, No. 4 (February 1961) is paraphrased in explaining this view of the problem. Another growing interest in hospital organization is the dual chain of command in which hospital administrative and medical cure functions combine to provide patients with integrated 'cure and care.' Hans O'Mauksch, in a lecture entitled, "The Formal and Informal Organization of Patient Care," is the source of definitions of the cure-care processes concept. Cure process is the therapeutic processes under the direction of the medical profession. Care process is the custodial and facilitating services organized as a hospital in the narrow institutional sense. The clinical nurse specialist may be considered a practitioner of care. However, many acts performed by a nurse will be care processes in one instance and cure processes in another. An example illustrates this point.

The management process consists of decision-making and communication. Professor Henry H. Albers (class lecture given in 1963 at the University of Iowa) described decision-making as a subjective and creative process through which the environment may be manipulated and as a scientific process.

A discussion of the clinical nurse specialist is presented prior to developing a place for her in the cure-care structure. Leading nursing educators provide a base point for further discussion. Laura L. Simms, Ed.D., Assistant Director, Surgical Department, The New York Hospital, describes an experiment in which a young baccalaureate nurse with several years of clinical experience in surgical intensive care was selected for a specialized clinical nursing position in which she was to become directly involved in the care of open-heart surgical cases. Shirley W. Armstrong, Clinical Specialist in Psychiatric Nursing, Essex County Overbrook Hospital, Verona, New Jersey, identifies the subjects in psychiatric nursing as rendered care to patients, resources person, and nursing care researcher. Betty Sue Johnson, Assistant Director of Nursing Services, Duke University Medical Center, Durham, North Carolina, suggests that the clinical nurse specialist has three areas of responsibility: patient care, teaching, and research. Eva H. Erickson, Associate Professor, University of Iowa, College of Nursing, believes that the clinical nurse specialist must have a deeper grasp of biological, physical, and social sciences and that knowledge so obtained provides the clinical nurse specialist with a background quite different from either the baccalaureate graduate or the physician. The report of the 1963 Evaluation Conference on the Professional Nurse Traineeship Program[1] provides a generalized definition of the clinical nursing specialist. She is to nursing what the specialist is to medicine. The basic ideas generally agreed upon by various leading nursing educators are that the clinical nurse specialist be trained at the master's level in the particular clinical specialty; that she function as a consultant to the nursing staff and that she provide direct nursing care in particularly challenging cases. The goal is to produce increasingly skilled professional nurses whose purpose is to provide maximal continuity of patient care when prognosis requires greater understanding of his needs. However, the best method for implementation varies. A nonacademic approach is presented to demonstrate another method to achieve this goal. Federal aid to nursing education has helped prepare more graduate nurses for positions as supervisors, administrators, clinical specialists, and teachers.

Descriptions of conventional patterns in patient unit organization are presented as a basis for examining patient unit organization's newer concepts. Chart 7 is a conventional organization chart. Chart 8 introduces the levels of management previously described. Patients and physicians are placed outside the management levels to demonstrate their relationship only to the extent that they are surrounded by the hospital complex. Chart 9 includes the care-cure structure. An additional upward channel is included for physicians. It denotes professional accountability of physicians to the medical staff. Chart 10 separates "cure" management from administrative management and illustrates the accountability of nursing personnel to the physician. The clinical nurse specialist is introduced in Chart

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[1] U.S. Department of Health, Education, and Welfare, Public Health Service. *Nurses for Leadership*. Public Health Service Publication No. 1098. U.S. Government Printing Office, 1963.

11 and shows her relationship administratively to the nursing service director. Chart 12 shows the unit manager in a peripheral relationship to the clinical nurse specialist. This chart considers the possibility in which a clinical nurse specialist may have dual accountability to a physician as well as the nursing service director.

Results.—In summary, part of the need for more registered nurses can be filled by clinical nurse specialists, graduates of master's programs devoted specifically to advanced nursing practice. These nurses are to be consultative personnel to head nurses and general duty nurses in a wide range of clinical specialties. They may assume direct nursing care and cure responsibilities on a temporary basis only and their activities are neither bound by hours or locale. Their responsibilities emanate from physicians to provide a foundation for development of advanced clinical nursing practice. The clinical nurse specialist role is an assumption of an increasingly larger role in the cure structure. A discussion of the decision-making processes demonstrates how a nurse integrates physical, psychological and interpersonal variables while evaluating patients in a clinical setting. The development of management levels concepts places the clinical nurse specialist's organizational role in sharper focus. She is not a part of management; she takes her place with both patient and physician outside management structure but within total patient unit organization.

Critique

The introduction of the clinical nursing specialist position in nursing services has taken place without much thought being given to the purpose underlying its creation and without plans for measuring its effect. The intent of this study is to provide guidelines for determining the content of the role and its effect on patient unit organization.

The method of study draws heavily upon a literature review and personal interviews. Unfortunately both of these are extremely limited, the literature in volume and the personal interviews in geographic representation. The ideas in the thesis are somewhat provincial. Furthermore, these ideas are presented as fragments and are not synthesized well in the models of organization that are proposed. The variations in organization structural arrangements are not evaluated sharply. Only limited theoretical framework from organization theory is given as a background for this part of the discussion.

The value of the study lies in bringing to the attention of the reader some of the points to be considered in the introduction of a new position. How the clinical specialist is built into the structure will have an impact on nurse staffing, especially in the conventional organization pattern at the leadership level.

A4. Angelus, Ruth E. "A Study of Felt Needs of Patients Compared with Interpretations of Patient Needs by Ward Personnel." Unpublished Master's Thesis, University of Texas, Austin, Texas, May 1959.

Review

Sample.—Ten hospital patients at John Sealy Hospital were selected, five from a male medical-surgical unit and five from a female medical-surgical unit and those personnel from the respective units whom patients nominated as performing negatively or positively to their liking.

Purpose.—To compare the felt needs of selected hospital patients with interpretations of patient needs by those hospital personnel toward whom patients expressed either positive or negative feelings.

Hypothesis.[1]—Ward personnel toward whom patients expressed positive feelings would demonstrate ability to understand patient behavior and accordingly would tend to satisfy patient needs effectively. The personnel toward whom patients expressed negative feelings would demonstrate less understanding of patient behavior.

Methodology.—The focused interview was chosen as the best instrument for the collection of data for this study. The nondirective technique was employed in the interview. Written notes by the investigator during the course of the interview were decided upon as the method of recording data.

The criteria for subject selection included: the ability to converse in English, hospitalization period of at least 1 week, physical ability to withstand the interview, ability to be transported to private area, possession of reasonably sound mind, and voluntary participation.

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[1] "Hypothesis" (singular) is written in the review as shown in the study.

A description of the interview guide is presented. Patients were interviewed as near to their day of discharge as possible. Personnel were interviewed after the patient's discharge in most instances.

The major areas of inquiry in patient interviews were designed to ascertain felt needs of patients and to elicit positive and negative feelings toward particular nursing personnel with whom patients had direct contact. Personnel interviews were designed to identify attitudes of personnel toward patients who had nominated them.

Findings.—Findings of the study did not substantiate the original hypothesis. Needs recognized by positive nominees were also recognized by negative personnel with few exceptions. Selection of personnel nominees by the patients seemed to have little bearing upon the ability of personnel to understand patient behavior. Patients selected personnel as negative nominees usually as a result of an unpleasant incident in which the patient felt slighted, rejected, or neglected by personnel. Personnel, as a whole, neither anticipated nor condoned behavior resulting from feelings of anxiety. Patients who denied dependency needs by insisting upon helping themselves were praised by personnel for being mature, self-sufficient, cooperative, and undemanding patients. Behavior reflecting feelings of apprehension and fear was not interpreted as such by personnel. Personnel knew little or nothing about patients' backgrounds, histories, and personal problems.

Conclusion.—The 10 patients discussed in this study, as a whole, were reluctant to discriminate between ward personnel, apparently because of unsatisfactory interviewing conditions, fear of retaliation from personnel, and suspicion regarding the purpose of the interview.

The personnel interviewed also seemed suspicious of the study and frequently appeared defensive in relation to their attitudes toward patients.

Personal interviews indicated that whereas symptoms of physiological origin warranted concern from nursing personnel, psychogenic symptoms were not the concern of personnel on a medical-surgical unit.

Patients interviewed expressed needs for understanding, individual attention, reassurance, explanation, avoidance of pain and discomfort, unsolicited interest of personnel, and the physical presence of someone in stress situations. Positive nominees were selected principally because they helped the patient maintain self-esteem. Negative nominees were selected because in some way they had threatened the patient's self-esteem.

Personnel interviewees neither anticipated nor understood behavior resulting from reactions to anxiety. Behavior stemming from cultural, moral, and ethical values that differed from the value standards of some personnel seemed to be regarded with intolerance.

Critique

This study is related to the research, but indirectly. It raises the question of the validity of using patients' opinionnaires as a measure of quality of care rendered. These patients (a limited sample) tended to hesitate nominating "negative" personnel and were reluctant to discriminate between personnel.

The study has implications for training of personnel but not for amount or levels of staffing.

A5. Aydelotte, Myrtle K., and Tener, Marie. *An Investigation of the Relation Between Nursing Activity and Patient Welfare.* Final Research Report (GN 4786 and GN 8570), University of Iowa, Iowa City, Iowa, 1960.

Review

Purpose.—To test the validity of the assumption that increases in the amount or quality of nursing care will produce improvements in patient welfare. This speculation was tested by increasing the size of a ward nursing staff and by introducing an in-service education program designed to increase the amount and quality of the nursing care given by a ward staff.

Hypothesis.—"If the size of a ward nursing staff is increased without lowering the average skill level of the staff (as represented by the proportion of graduate nurses) and without increasing the average patient census, the staff will, without additional training or instruction, reallocate their duties in such a way that more time will be allocated to those activities most important to the welfare of the patients. This shift in time allocation will in turn improve patient welfare."

Approach.—Graduate nurses were added to the regular staffs of certain wards. Work sampling data were collected before the ward staffs were increased, after the ward staffs were increased, and from other wards where no experimental changes were introduced.

An inservice education program was provided and ward staff was increased to determine the effect of the combination of these two experimental variables.

The influence of a more extensive inservice education program was also evaluated.

Sample.—The sample size in each of the experiments varied. Six nursing units at the University of Iowa Hospital were the study sites.

Nursing Activity Instrument.—The Nursing Activity Instrument was designed to show how time was allocated among the general categories of nursing activity. Nursing was divided into 19 activity categories which were grouped into seven broader categories, and each was described in detail. The major activity entitled "direct patient care activities controlled by the nurse," included bathing, comfort, and communication with the patient. The second major category entitled "direct patient care activities only partially controlled by the nurse," included the following minor categories: nutrition, elimination, medication, treatments and procedures, and patient transportation. Major Category III, "variable communication," included charting and information exchange. The fourth major category was entitled "cleaning and specimens." Category V, "non-variable communication," included reports, clerical preparation, empty transportation, and laden transportation. Category VI, "preparations," included all preparations for procedures, treatments, and medications not done in the presence of a patient. The final major category was "personal and miscellaneous activities," and included delay and personal, out of area, and other. Categories were used to assure observer consistency and to assure large enough observations in each category to permit statistical analysis. Categories were defined so that they would be sensitive to small changes and would separate direct from indirect activities. Work sampling was used to study nursing activity.

Observations were made by experienced nurses who had been trained. A total of 56 observation tours were made each day. No observations were taken between 11 p.m. and 7 a.m. Starting time of each tour was random. Starting time was the same when two or more wards were being compared. One observation sheet was used for each tour on each ward. Each staff member was observed only once on each tour. To test agreement between observers, the observers went to patient units in groups of three and observed 100 separate nursing acts done by various staff members. These observations were compared and differences were discussed. No observer was considered trained to collect study data until after having received acceptable agreement with other observers. Agreement checks throughout the study showed 98 to 99 percent agreement.

Nursing activity data were collected from several clinical areas prior to the full-scale experiments in order to determine the sensitivity of the Nursing Activity Instrument and to determine the inherent day to day variability of the nursing activity pattern. Data collected from Surgical Services and Medical Services were subdivided into individual wards. A standard chi-square test indicated significant difference in the pattern of nursing activity between the two services. Data collected from two urological wards and two general surgery wards were analyzed using the standard chi-square test, to test the differences between one period of time and another on the same ward and differences between wards on the same service. Results showed that the Nursing Activity Instrument was sensitive to detect variations but also showed that a large amount of variation existed at normal conditions. The noncentral chi-square test was used to distinguish differences in the activity pattern that was in excess of the inherent variability. The development and procedure of the noncentral chi-square test is described in depth.

Possible sources of variability in the pattern of nursing activity are variations in patient census; fluctuations in the number of seriously ill patients; differences in patient load; lowering of total nursing care hours on weekends; fluctuations in the number of graduates, students, and subsidiary personnel; fluctuations in the proportion of graduates and other personnel composing a ward staff; differences in staffing proportions between wards; differences in the class level of students assigned to different wards; individual differences between staff members; individual differences between head nurses; and individual differences between resident physicians. The control measures used to reduce the effect of these variables are presented in detail.

Patient Welfare Measures.—A set of Patient Welfare Measures included those physical and behavioral characteristics that change as the patient's condition changes. The characteristics that were chosen were selected according to the following criteria: believed to be related to the response expected of a hospitalized person, believed to be affected by those changes in ward conditions that were to be made during this study, capable of being consistently identified, suitable for quantification and statistical treatment, related to one another, and data readily obtainable. Each characteristic selected was developed according to the following criteria: sensitive, reliable, simple and easy to use, statistically usable, and applicable. These measures fall into three groups (Clinical Measures, Scaled Measures, and Sampling Measures) according to the method of data collection.

The four Clinical Measures were the number of days the patient was in the hospital, the number of days he had a fever, the number of days he was in the hospital after undergoing surgery, and the drugs (narcotics, analgesics, and sedatives) received. The data for these measures were easily obtainable from hospital records.

The Scaled Measures were those measures for which the patient is ranked at some point along a "poor" to "good" scale with the aid of graduated statements that describe different degrees of the characteristic being measured. The Scaled Measures were revised during the experiments in order to increase their sensitivity to small changes in patient welfare. The Scaled Measures include mobility, mental attitude, physical independence, special aspects of independence, skin condition, patient opinion, and physician's evaluation. These scales went through several generations of revisions. The methods used to obtain a reliable and valid instrument are presented in detail.

The Patient Activity Sampling Measure was an instrument used during the last two experiments in an attempt to develop a measure sensitive to small changes in patient welfare. The four Patient Activity Sampling Measures were designed to give a picture of the average amount of time patients spent in four broad categories: percentage of time spent in bed, percentage of time spent in a chair, percentage of time spent up, and percentage of time spent in communication and occupied leisure. The method used to collect patient activity data was based on work sampling techniques.

For purposes of comparison between different wards and different data periods, mean scores were computed for each of the Patient Welfare Measures. For the Clinical Measures, the scores were the average number of days or doses of medication. For the Scaled Measures, the daily numerical ranking each patient received was averaged. A mean score was computed for each measure by averaging the mean rankings of all patients on a ward. For the Patient Activity Sampling Measures, the mean scores were computed by averaging the percent of time each patient devoted to each activity area. For each patient welfare measure, the mean score under different experimental conditions was compared.

Experiments.—Five separate experiments provide data regarding the effect of additional staff and the inservice education program.

In the first experiment an increase in the size of a ward staff was the experimental variable. This experiment was designed as a preliminary exploration of the underlying hypothesis; that is, a rough determination of the general influence of increases in staffing on patient welfare would give the study staff some idea of how to set up instruments for identifying the most beneficial nursing acts. In terms of nursing hours, the size of the ward staff was increased approximately 40 percent during the two 5-week increment periods. Since the average patient census for each of the data periods was similar, the increase in nursing care hours available to the patient was also 40 percent. The noncentral chi-square test had been designed to detect only those differences that were greater than the inherent amount of day-to-day variation. Therefore, the fact that no significant differences were detected within any of the data periods showed the noncentral chi-square test to be acceptable for subsequent experiments. To analyze the data from this experiment, the base period and two 5-week periods of increased staff were compared. Data concerning time spent in each nursing category, nursing care hours per patient and use of additional time is presented. The mean of scores rather than the correlation between patient welfare data was used because the mean was more reliable. The results of this preliminary experiment were contrary to expectations since increased nursing time was spent in delay and personal activities. Results were not disclosed to the project staff or nursing personnel until after a similar experiment was done on a medical unit.

The increment experiment on medicine was also to determine the influence of increasing the size of the ward nursing staff. Two female wards, one experimental and one control, were used. All of the patient welfare measures, with the exception of the Patient Activity Sampling Measure, were used in this experiment. The procedure is explained in terms of experimental design, patient census, nursing hours, and nursing care hours per patient. Nursing activity results and patient welfare results are considered separately. The activity results are analyzed in terms of hours spent in each nursing activity—percent of staff time spent in each activity, NCH/P spent in each nursing activity, how the additional time was spent, activity pattern during morning and afternoon, and behavior of category concerning standby time. Patient Welfare data were collected for both the control and the experimental wards. Each patient's ratings were averaged and the average for each patient was included in the composite score for each welfare measure. The results contradicted the assumptions of the underlying hypothesis and the decision was made to introduce inservice education.

In the Combination Increment and Training Experiment, two experimental variables were introduced simultaneously. The surgical ward was first observed for 6 weeks at the basic staff level. A 3-week inservice education period followed. A 6-week period of incremented staff was then followed by a 6-week period of base level staff. The inservice education program was planned and presented with the cooperation of the head nurse on the experimental ward, individuals from the nursing service office and faculty members from the College of Nursing. The 3-week inservice education program consisted of lectures, discussions, and some assistance on the floor. Team nursing was initiated. Basic data regarding census, nursing hours, and nursing care hours per patient are presented. The results of increased staff and inservice education are given in terms of nursing activity and patient welfare. Hours spent in nursing activity categories, NCH/P spent in nursing activity categories, how additional time was spent, and chi-square comparisons are presented. Data from Patient Welfare scores showed no significant difference in patient welfare.

The fourth experiment regarding the effect of inservice education program was done on the medicine unit. The purpose of this experiment was to investigate the influence of a more extensive inservice education program. The procedure is described according to experimental design, patient census, nursing hours, nursing care hours per patient, and preparation, presentation and evaluation of the inservice education program. Two female medical wards were used. Base data were collected on both wards, and personnel on the experimental ward participated in inservice education followed by another 6-week period of data collection on both wards. In order to provide individualized instruction and guidance for the members of the ward staff, a preceptor was selected to work closely with the entire nursing staff on the experimental ward. Her qualifications were competence in medical nursing and administrative nursing practice, a balanced point of view between the extremes of physiological and interpersonal nursing care, competence in teaching, and ability to gain acceptance of medical and nursing staffs. The inservice education program dealt with medical theory and therapy, nursing care, ward management, and interpersonal relations. The program was evaluated by the preceptor and the director of nursing service. The results showed no evidence that the inservice education program had any favorable effect on the way the ward staff allocated their time. Six of the Patient Welfare Measures were revised prior to this experiment. The scores were analyzed according to mean and standard deviations as in previous experiments. An analysis of variance provided a more powerful statistical tool for this experiment. The results caused serious doubt about the effectiveness of this type of inservice education program. Any improvement in the quality of care was not reflected in patient welfare.

The fifth experiment was similar to the previous experiment done on the medicine unit. The inservice education program was similar in that it was 6 weeks in length and conducted by the same preceptor and changed only because of the needs of the staff on urological units. The results substantiated the results of the previous experiment; that is, the inservice education program did not improve patient welfare.

Results.—The conclusions are divided into four aspects. The experimental results are reviewed according to the chronological order of each of the five experiments.

The validity and reliability of the nursing activity instrument and the patient welfare measures are defended. Detection of differences in activity patterns between wards, between clinical services, between levels of nursing personnel, between increment and base conditions, between 7 a.m. to 3 p.m. and 3 p.m. to 11 p.m. shifts, and between junior and senior nursing students were evidence of the sensitivity of the Nursing Activity Instrument. The validity of the Patient Welfare Measures is suggested by the use of experts to support face validity and agreement with physicians evaluation as a criterion measure. The welfare measure did indicate differences between individual patients, between groups of patients classified according to age and general condition, between means of data periods and detected improvements in groups of patients during their hospital stay.

The results were interpreted as • neither incrementing nor inservice education improves patient welfare; • adding nurses is an inefficient way of getting more direct patient care; • inservice education does not necessarily improve patient welfare or ward efficiency; • factors such as status, social pressure, motivational factors, and interpersonal skills may influence the NCH/P allocated to direct patient care; • additional speculations suggest that use of subsidiary personnel does not lower patient welfare, the nurses are not overburdened with paperwork, graduate nurses may be more concerned about amount of direct care given than the amount of direct care she gives, and the nurse may be concerned about nurse welfare.

Suggestions for further investigation are to test the general applicability by repeating the present study in other hospitals that have different base levels of NCH/P and to explore the possibilities of improving patient and nurse welfare by manipulating variables other than those investigated during the present study.

Critique

To test an assumption to determine if the assumption is true requires the willingness to accept the finding that the assumption is untrue. This research study directed at such testing has resulted in findings that have not been popular with the nursing profession. In *Nursing Research: A Survey and Assessment*, (New York: Appleton-Century Crofts, 1964, p. 270), Simmons has written that the finding: "No improvement in patient welfare was produced by substantially increasing the size of the ward staff, by conducting inservice educational programs, or by combining staff increases and inservice education," is a "challenging and sobering finding for the nursing profession, especially when one considers the amount of thought and planning that went into the project, the apparent technical care with which the 'experiments' were set up and the criteria and measurement procedures formulated, and the sum of professional effort and financial resources that were expended on the enterprise."

The report is also significant in that it is a forerunner of the attempts made to measure the effect of nursing care upon patients. Attention was given to the problem of design, operational definitions, sampling, instruments, and other technical details. The authors anticipate many of the objections or questions that may be raised as a result of the study and discuss each of these in arguments that are rational and logical. Validity and reliability of the instruments are ably defended.

Criticism has been raised about the Nursing Care Variable in that the proportions of professionals and nonprofessionals assigned to nursing units were not held in the exact ratio. However, the experimental variable was not this element, and many readers overlook this fact. The first experimental variable was the introduction of additional nursing hours. These are operationally defined as those provided by the group of registered nurses. The second experimental variable was the educational program. Again these are well described and were designed to copy programs which at that time were in current vogue.

The impact of the study has been great. Over 2,000 copies of the study have been distributed. It has been used in many graduate programs. The instruments have been applied in other settings and references are made to the research in the work of other investigators.

A6. Bishop, Mable Lyndon. "An Investigation of the Relationship of Job Satisfaction and Absenteeism Among Nursing Personnel in a Medical and Surgical Department at a Selected Hospital." Unpublished Master's Thesis, University of Texas, Austin, Texas, May 1959.

Review

Purpose.—To determine the level of job satisfaction as expressed by professional and nonprofessional nursing personnel; to determine the absence rate for each category of personnel participating; and to determine the existing relationship between expressed job satisfaction and absenteeism.

Hypothesis.—This is a positive correlation between the expressed level of job satisfaction and the rate and frequency of occurrences of absences among professional and nonprofessional nursing personnel.

Methodology.—The location of this study is a 10-unit medical and surgical department of the University of Texas Medical Branch Hospitals, Galveston, Texas. Subjects for this study included professional personnel (nine head nurses and 21 staff nurses) and nonprofessional personnel (16 licensed vocational nurses and 36 nurse aides) employed full time. "From each unit, the head nurse, staff nurses, licensed vocational nurses, and nurse aides were asked to participate. Several refused to do so, even though the writer emphasized that all answers would be kept confidential." Ninety percent of the head nurses responded, 58 percent of the staff nurses responded, 56 percent of the licensed vocational nurses responded, and 65 percent of the nurse aides responded. Of the 89 questionnaires distributed, all but seven were returned.

A coded questionnaire was constructed by the investigator to elicit reliable responses regarding the four selected factors influencing job satisfaction. Selection of the four factors influencing job satisfaction was based on four of the most frequently stated causes of dissatisfaction among workers found in a survey of literature pertinent to the subject. The series of questions pertained to supervision, salaries, hours of work, and domestic responsibilities.

An evaluation of the questionnaire was made by conducting a pilot study. Questionnaires were given to 20 persons, incuding head nurses, staff nurses, licensed vocational nurses, and nurse aides. Constructive criticism was received and implemented.

The degrees of satisfaction expressed in response to the questionnaire items were grouped into three categories: satisfied, moderately satisfied, and dissatisfied.

To determine the extent to which job satisfaction was related to absenteeism, a statistical analysis using the tetrachoric coefficient of correlation was used, since data could be artificially reduced to two categories. One set of correlation was based on the 4 percent average absence rate and the job satisfaction index that was made possible by tabulating positive responses to the job satisfaction items. The second coefficient was based on the closest day to the median number of days absent and the job satisfaction index.

Absence records of personnel participating in the study were made available for this investigation through the Nursing Service office. Total days absent and times absent were tabulated for each person over a 17-week period.

Findings.—This study has shown that most professional and nonprofessional nursing personnel are satisfied with their hours of work but that they are dissatisfied with their salaries. The nonprofessional personnel were more satisfied with their supervision than were the head nurses and staff nurses. Approximately one-half of the staff nurses were dissatisfied with the supervision they received from their head nurses. Domestic responsibilities seemed to be greatest among the nonprofessional group. The largest number of absences for the 17-week period was tabulated for the head nurses. There appears to be some relationship between job satisfaction and absenteeism even though the hypothesis under investigation was not entirely supported. The final correlation for the entire group revealed a tendency for the less-than-satisfied personnel to be absent from duty more days than the satisfied ones. The highest correlation was found among the nurse aide group.

Critique

This is an important question in that there is a need to examine the relation between expressed satisfaction and factors influencing absenteeism. However, of the factors used (supervision, salaries, hours of work, and domestic responsibilities) only two, supervision and hours of work, relate directly to staffing. These two did not include size of assignment and physical demand of work.

The methodology used was the survey method. No attempt was made to test the instrument. Face validity was used.

Absenteeism was defined by number of days absent. Job satisfaction was defined by positive response on job satisfaction items. Almost all (both professional and nonprofessional) are satisfied with hours of work. The satisfaction with supervision decreased with professional preparation. But over 50 percent of staff nurses were dissatisfied with supervision.

The significant findings from the study indicate that there are differences between professional and nonprofessional personnel as to what contributes to satisfaction.

The research design of the study is adequate. The additional knowledge gained from the study is minimal.

A7. Blumberg, Mark S. "The Effects of Hospital Size and Specialization." Xeroxed report (W20-3), Stanford Research Institute, Menlo Park, California, (no date).

Review

This paper is concerned with the optimal system of hospital services independent of payment procedures. The quality, cost, and convenience of short-term hospitals are factors that relate to hospital size, specialization, doctor office location, and doctor specialization.

The criteria used to organize hospitals into six groups are the size, provision of specialized nursing units, whether hospitals are specialized, and the geographical location. The six basic types of hospitals are small general hospitals without specialized nursing units, small general hospitals with many special nursing units, small specialized hospitals with a few types of specialized nursing care units geographically distributed or clustered, a large general hospital with general nursing care units, and a large general hospital with many specialized nursing units.

The comparison of hospital types is based on the specialization and cost of nursing care, availability and cost of other hospital services, probability of interhospital transfer of patients, ability of one hospital to care for all of a given physician's patients, and travel time of patients for medical purposes.

The cost of providing nursing care can be related to the specialization of care and the overall size of the hospital. Theoretical consideration of the variance in load in distinctive patient facilities and the necessity of around-the-clock staffing indicates that the cost of nursing care should be relatively low in both the small and large general hospitals and high in the small hospital with many specialty units and medium in the other hospital categories.

Provision of specialized supporting services that can be done outside the hospital or shared services can achieve economies of scale. The costs of providing specialized supporting medical services and hotel services should be lowest in large hospitals. The costs might be reduced to an equal level in small hospitals if a group of hospitals makes use of shared services. Specialized supporting services might be low in specialized hospitals because of the small range of services, but there must be a high enough volume to permit economies of scale. No objective evidence could be found to support the thinking that large hospitals may be more costly to run or that they provide inferior care.

Two types of patient transfer situations are determined by the need for special facilities or the need of a specific doctor. The need for interhospital transfers can be minimized if the proper classes of patients are selected for admission. A small specialized hospital offering a broad range of services reduces the necessity of transferring patients at a high cost. Transfer should be low in large and small hospitals with many specialized units. Transfer is highest in a small specialty hospital.

A doctor may use different hospitals for several reasons. There may be a shortage of beds in the doctor's principal hospital. Accident patients are brought to the nearest hospital and the family doctor is called. Some services are not available in the doctor's principal hospital. Patients may already be hospitalized in another hospital and some patients have specific preferences. Assuming the doctor's office is close to the principal hospital, patient's travel time will be least for these general hospitals. Patient travel time is higher for large general hospitals with specialized care units. A separate doctor whose practice is confined to hospitalized bed patients and one whose patients are out of the hospital would reduce doctor and patient medical travel time. Changes in the quality of care may result from lack of continuity in the care of patient and the increased level of expertness by the hospital specialist.

Summary.—The negative features of the small general hospital are its inability to provide specialized nursing care, high cost for other hospital services, and inconvenience to medical specialists. The small general hospital with many specialized units provides specialized nursng care at a high cost. There is a high probability of interhospital transfer and inconvenience to general practitioner and patient in the small specialized hospital. There is a lack of provision for specialized nursing care and high travel time for patients in the large general hospital. The only negative feature of the large hospital with many specialty care units is the high travel time for patients.

Critique

This paper is only indirectly related to the queston of nure staffing methodology. Its major focus is upon the relationship between specialization, size, availability of other services, and cost of hospital and medical services. The paper is thoughtfully and carefully developed. However, only a few tables are presented to support the statements made. Supporting detailed documentation is lacking. Nevertheless, the ideas presented are provocative and pertinent to the health care delivery systems. Individuals engaged in the operation of nursing services will find the paper useful in examining the underlying reasons for variation in costs between nursing services. It will not assist them in looking at staffing methodology itself.

A8. Bognanno, Mario Frank. "An Economic Study of the Hours of Labor Offered by the Registered Nurse." Unpublished Doctoral Thesis, Department of Business Administration, University of Iowa, Iowa City, Iowa, June 1969.

Review

Purpose.—(a) To develop a separate economic decision model for the single and married professional nurse that explains market work behavior.

(b) To test each of these theoretical decision models using data from a cross-sectional random sample of registered nurses.

Method.—The format of this study is divided into five stages. The introduction includes the objectives. The theory of the professional nurses labor supply is concerned with the orthodox market work-leisure model, generalizing the orthodox market work-leisure choice model and theoretical nature of the offer function of the single and married nurse. Formulating the theory for testing includes identification of the proxy variables representing the theoretical variables and presenting testable representations of the theoretical models. The empirical section of the study includes methodology and least squares estimates of the parameters associated with both of the theoretical models. The fifth chapter presents a summary.

The theoretical analysis of hours of market work offered by the registered nurse is presented in depth. The theory of the individual's offer of work based upon the orthodox market work-leisure choice model is presented mathematically and graphically. This theory was accepted as the basis for analyzing market work behavior of single nurses. However, the market work offered by the married nurse must consider the family context of leisure and work choices and the home market dichotomy within the world of work. A more generalized theoretical model accounts for the broader work choices facing the married nurse and the family's demand for home produced goods. A formula represents the single nurse's utility function and the generalized offer (supply) function. A more detailed formula represents the married nurse's generalized offer function that includes the tastes of other family members, given her potential income constraint.

The previously developed models are theoretical abstractions that require certain modifications before the theoretical relationships can be measured and tested. "Proxy" variables, used to represent the theoretical variables, are discussed and defined. The theoretical determinants of hours worked by single and married nurses are the hourly market wage rate, the return to real property or other nonwage income, wage earnings of the husband, married nurse's family income, price level for different areas, price the family places on home produced goods and services, and tasks for market work relative to other time consuming activities. Based on the data from a random sample of professional nurses living in Iowa, the hours worked per week and the weeks worked per year were used as empirical proxies for the theoretical variables.

Since some of the theoretical determinants of labor supply are unobservable, both "continuous" and "dummy" variables are used as proxies to represent the theoretical variables.

The selection of certain variables is described in depth and verified by results of other studies. Separate theories of market work behavior for the single and married professional are represented by testable models. The proxy variables that correspond to the theoretical variables are labeled. The hypotheses concerning economic and taste factors are expressed in mathematical models.

The fourth chapter describes the data collection process and presents multiple least squares estimates for the coefficients in each equation model. A comparison between each theoretical hypothesis and its empirical counterpart indicates whether or not each hypothesis is accepted or rejected.

A sample survey was conducted to obtain information about the single nurse and the nurse-family unit. A mail questionnaire was designed to elicit relevant information concerning the nurses' current work status, family finances, family structure, and other matters relevant to the analysis.

Sample.—The universe from which the sample was drawn includes all registered nurses who are residents of Iowa, 65 years old or under, and nonmembers of any religious order. The Iowa Board of Nursing provided information on each nurse licensed by the State of Iowa. A total of 19,789 records of nurses met the criteria. A 10 percent sample was drawn from each one of the 16 geographic regions. The actual sampling process is described in detail.

The sample consisted of 2,002 individuals. The 1,625 returned questionnaires showed the response rate of usable questionnaires to be 78.8 percent. Sources of nonsampling error are explored and defended.

Analysis.—Organization of the data shows the distribution of registered nurses by marital status. Lack of homogeneity resulted in the deletion of records for married nurses with retired, disabled, or student husbands. Because these subgroups were expected to exhibit special labor market behavior, special analysis would be required.

Estimates of the coefficients in several multiple regression equations are presented. The theory of market work offered by the single nurse is the basis for the regression results of model A. A table presents the partial coefficients of correlation between the dependent variables hours of work per week (1968) and weeks of work per year (1967) and the independent variables: expected nurse's wage, nurse's nonwage income, age, age squared, renting home, buying home, size of community. A discussion of the characteristics of the data underlying the estimates is presented. Model B is a representation of the theory of market work offered by the married nurse. Regression results were obtained using hours worked per week and full-time equivalent weeks as the dependent variables. The independent variables were expected nurse's wage, expected husband's income, transitory husband's income, family income, child under six, number of children at home, nurse's age, renting home, or buying home.

Findings and results.—Results show that the married nurse's expected wage is positively related to labor supply. A separate series of regressions was calculated for the nurses who were in the labor force during the previous year. The estimates were calculated to determine how well the equation determines the amount of time the married nurse will devote to market work and how responsive the already employed married nurse is to variations in variables.

The empirical results of this study and how these results are related to the hypotheses are explained in detail. The theoretical models performed extremely well to the statistical significance of the estimated coefficients that correspond to each theoretical hypothesis.

The empirical analysis of market work behavior by the single nurse revealed that labor offered for her is directly related to the variables: age, renting home, and urban residence, and inversely related to age squared and nonwage income. The sign of the estimated coefficient for "buying home" was as predicted but was not statistically significant from zero.

The empirical results show that the married nurse's market work decision is more difficult to explain. Statistically significant determinants of the married nurse's offer of market labor are the following variables: husband's expected income, transitory income, family income, presence of a child under six, number of children, buying home, and renting home. The most important independent variable was income, followed by presence of a child under six, buying home, and number of children.

The husband's estimated expected income and family income were very similar for the 1968 hours worked and the 1967 weeks worked, supporting the theoretical arguments posed in this study.

Husband's expected and transitory income were highly significant determinants of labor supply. However, estimated coefficient for permanent income outweighs the absolute value for transitory income in the long run.

Variables such as buying home or renting home may not change, though time factors like the birth rates, size of family, husband's income, and market wages are constantly changing.

The results of this study support the recommendation that child day care centers are one way of getting employed married nurses to work more hours and to attract inactive nurses back into the labor force. Also, 81 percent of Iowa's inactive nurses planning to return to work in the future say they will be seeking a part-time job. Scheduling hours to conform more closely with a family's time schedule will increase supply. The impact of increased wages will result in an increase of the employed married nurse's contribution to the labor market.

Critique

This research examines a highly significant question, since the need for active manpower in nursing is obvious as is the large number of inactive nurses. The question of what comprises an inducement to return the inactive nurse to the active practice of nursing remains unsolved. The theoretical model that the author designs for testing is built upon the classical two commodity universe (leisure and market produced goods and services) modifying it for the nurse labor market and goods consumption. He states that the application of the model may be true for the single nurse, but that other factors influence the married nurse. The decision of the married nurse depends upon her allocation of time between "hours of leisure" and "hours of market work for nonmarket wages." Bognanno uses the model proposed by Jacob Mincer for the explanation of the second group's work behavior, modifying it for use in this study.

The design of the study is standard and appropriate. The sampling is well described. The questionnaire items reflect parameters to be measured in the model but are characterized by face validity only. No tests were conducted for either validity or reliability of the questionnaire. Statistical treatment of the data was carefully handled. The possibilities of sampling error were clearly described.

This study deals only indirectly with nurse staffing requirements. But it does provide us with valuable insights about the manpower question.

A9. Brodt, Dagmar, and Anderson, Ellen H. "Content Validation of a Nursing Practice Evaluative Instrument: The Service Manager System: Nurse Efficacy and Cost." (NU 00170-01), Barnes Hospital, St. Louis, Missouri. (Mimeographed.) (No date.)

Review

This report presents the initial development of the content validation of a set of patient welfare scales which are designed to reflect the effectiveness of nursing practice. Eleven components of patient welfare were identified. A nonforced Q-sort procedure was employed for content validation. Methodology included observation and scoring of a random sample of patients on behavior in each of the 11 categories. A total score was obtained by summing the 11 components. Analysis involved reviewing successive total patient welfare scores and comparing patient scores on the "service managed" nursing units as opposed to the "traditionally managed" nursing units. The initial chi-square tests indicate statistically significant differences between the two types of management for seven of the 11 patient welfare scales. The total scores on Patient Welfare for both groups tested by the Kolmogorov-Smirnov test showed no difference.

This article discussed primarily the instrument development and not the study itself.

Critique

A major problem in the study of the effect of various parameters of staffing (the mix, amount of staff, qualifications of personnel, and pattern of hours) and of the effect of changes in supporting services upon the activities performed in nursing units is finding the means by which one will measure the influence of these variables upon the patient. This brief document reports the efforts to validate the content of items built into a set of scales reflecting measuremnet of patient welfare.

The approach used in the study is clear and logical; however, a number of important steps were either not taken or are not described in the document because of its brevity. There is no reference to a test for observer reliability and no application of an external criterion measure for validity. One can seriously question the use of senior students, who have not yet reached the knowledge level required for practice, as determiners of the validation of content built into the items of patient welfare. The value of the report lies in its attempt to examine patient welfare, but at the same time the reliability and validity of the data obtained in the study remain suspect.

A10. Cazin, Carol Ann. "A Study of the Frequency of Selected Activities Performed by Registered Nurses in Sixteen Small and Six Large Hospitals in Wyoming." Unpublished Master's Thesis, University of Washington, Seattle, Washington, 1964.

Review

Purpose.—To determine and compare the frequency with which selected activities were being performed by registered nurses in 16 small and six large hospitals in Wyoming.

Sample.—All general, short-term, non-Federal hospitals (28) were invited to participate in the study. Twenty-two replied that they were willing to have their registered nurses participate. A total of 438 nurses were employed. Questionnaires from 300 nurses were returned; 68.5 percent of the nurses in small hospitals (less than 50 beds) replied and 68.5 percent of the nurses in hospitals over 50 beds responded.

Instrument.—The questionnaire was constructed with a four-point scale for rating the frequency with which atcivities were being performed. Activities listd were based on review of literature, experience of nurses, and other activity studies. Two administrators of small hospitals identified those procedures taught to new staff members. Space was provided for comments. Demographic data comprised the first page of the questionnaire.

The questionnaire was reviewed by an administrator of a small hospital, four graduate students, and a research worker. A pilot study was conducted at a 100 bed Seattle hospital and two small hospitals in Wyoming. A total of 19 registered nurses in the large hospital and nine nurses in the small hospitals participated in the study. A revision of the questionnaire followed the results of the pilot study. The questionnaire consisted of 105 questions to be answered either "yes" or "no," or to indicate "always," "often," "seldom," or "never." The questionnaires were mailed to the director of nurses who was asked to distribute the questionnaires. Data were tabulated and percentages were used to compare the responses between large and small hospitals.

Findings.—"The data indicated that the setting up of tents, masks, and cannulas for the administration of oxygen was the selected activity performed with the greatest frequency by registered nurses working in small hospitals." Administration of anesthetics in the delivery room, determination of progress of an obstetrical patient in labor, and responsibility for calling a doctor for patients entering the emergency room were the activities "always" or "often" reported by the greatest number of registered nurses in the small hospitals. The activities, performed "often" or "always" by the nurses in the large hospitals were masks and cannulas for oxygen administration, starting blood transfusions, and administration of intravenous medications. All of the previous activities were performed frequently by nurses in both sizes of hospitals. In addition, the nurses in small hospitals frequently determined the urgency of a situation in the emergency room or outpatient department, cleansed wounds prior to physician examination, dispensed drugs from pharmacy, and set up traction equipment.

Activities that were "seldom" or "never" done by most of the registered nurses in small hospitals were likewise not done by nurses in large hospitals. Over half of the selected activities were "seldom" or "never" performed by 75 percent of the nurses in large and small hospitals. These activities included maintenance work, dietary planning, coding of charts, preparation of birth and death certificates, purchasing supplies, patient bill collection, physical therapy, X-ray, male catheterization, male surgical preparations, operating the switchboard, and releasing information to the press.

Critique

Not infrequently, one hears the comment that nurses employed in small hospitals perform different tasks from nurses employed in large hospitals. If this statement is true, the staffing requirements in these two categories of hospitals are different. This study examines the question by a study of the frequency of nursing activities performed in hospitals classified into two groups, under 50 beds and over 50 beds.

Unfortunately, although a pilot test was made of the questionnaire to ascertain its clarity and comprehensiveness, no test of reliability of its use was made; neither was there a determination through direct observation of a small sample to ascertain if what was reported in fact occurred. The sample size in the pilot study was small (28) and the number in each category unequal (19 versus nine). Some distortion at this point in the study could have taken place. The use of the terms depicting frequency, such as "always," "often," "seldom," or "never," were not tightly defined operationally, such as through the use of frequency of performance over a period of time. Therefore, the interpretation of the meaning of these terms is dependent upon the reader. This ambiguity and lack of reliability limit the value of the study.

A11. Connor, Robert Joseph. *A Hospital Inpatient Classification System.* Unpublished Doctoral Dissertation, Industrial Engineering Department, Johns Hopkins University, Baltimore, Maryland, 1960.

Review

STUDY 1

Purpose.—"The purpose of the study was to identify the elements of patient care and to determine the approximate times to perform them." It was desired to establish the elements assigned to personnel levels and the sequencing of those elements.

Method.—The method of direct observation of patients was selected.

Sample.—A conference was held with representatives of the nursing department in order to assure that a valid cross section of ward experience was being observed. A period of 4 days was chosen so that a representative picture of direct patient care would be obtained. The prospective observer ran a pilot study and found that he could effectively observe four patients each day.

The criteria for selection of patients were mobility, consciousness, emotional disturbance, inadequate vision, and isolation. The patients were grouped according to their possession of these attributes and then as nearly as possible an equal number from each group was observed.

A medical clinic, surgical clinic and opthalmological clinic were selected in order to ascertain whether there was any difference in the basic care between clinics and sex. Because the wards within a clinic were not assigned patients with particular types of illness or sex, the nursing staffs were allowed to select the floors to be observed.

Procedure.—One observer made observations in shifts: 6 a.m. to 12 noon and 2 p.m. to 6 p.m.; 12 noon to 2 p.m.; 6 p.m. to 12 midnight, and 12 midnight to 6 a.m. The midnight to 6 a.m. shift was observed for only 2 days.

The data sheet shows recordings of care given, time of day, the duration of the care elements, and by whom the care was given. Time was accurate to the closest minute.

The study was carried out in July, August, and September 1957.

Sixteen patient days were observed on each floor, a total of 48 men and 48 women.

Analysis.—An inspection of the data sheet showed that direct patient care accounted for an average of 5 percent of personnel time from midnight to 6 a.m. This time period was not included in the study.

It was observed that the criteria being used to group the patients were imprecise and there were large variations in the care received in each group.

The patient class definitions were developed and based on elements of patient care as defined. These elements were taking temperatures, giving baths, making beds, comforting, checking, help with food, medication, etc. The three classes are based on certain elements of care. When the definitions were applied to the patients observed, a constant number of patients were found in each class throughout the wards. On the basis of analysis of variance, the significant difference was between categories and not between sexes. Statistical tests indicate that the average times for each class of data are significantly different.

A discussion of classification is presented.

STUDY II

Purpose.—To investigate patient classification in order to demonstrate that classification of the patients was feasible, to attempt to determine the patient characteristics that were sufficient to classify, to study the behavior of the patients in each class and to study the ward and hospital patient composition.

Sample.—A group of 46 patients was observed for 4 days. The patients at the Osler Clinic (Medical) were observed from 6 a.m. to 12 midnight.

Instrument.—A questionnaire for nursing personnel was designed to provide the necessary information about patients and to be easily read, answered, and summarized. The questionnaire was revised by eliminating redundant and unnecessary questions and by simplifying definitions.

Procedure.—To determine the accuracy of the patient classifications from the questionnaires, a work measurement study was done. Patients were classified from the patient questionnaire independently of the observations.

Results.—There were no significant differences between the average times obtained in the initial study and this study.

The proposed classification system permits the association of care times with patient classes.

The mechanics of answering the patient questionnaire system are spelled out in five stages.

Index.—If the products of the number of patients present in a class times the average care time for that class are summed, the result is an estimate of the patient care that will be given. Studies of the indices show:

- Patient care is a function of the number of patients of each type rather than census alone.
- If the index is plotted against calendar time, the variation in nursing care hours can be seen.
- The main determinant of the index (the nursing care load) is the number of Class III patients.
- Patient care loads are independent of one another and therefore the average demand of four floors has a smaller variation than one floor.
- Class III patients have a pre-emptive priority on the hospital's beds. This patient will always find a bed open to him representing a queueing theory. A system known as infinite parallel channel queue. "The arrivals of Class III patients have been analyzed and appear to be of a Poisson type, and the length of stay in Class III patients can be approximated by a negative experimental distribution." Thus the nursing care load must be expected to have a large variation.

STUDY III

Purpose.—To determine the relationship of the total nursing workload to the direct patient care load.

Productive activities were defined as:

"Direct Patient Care: any activity in contact with patient or activity that would, if patient were present, be in contact with him."

"Indirect Patient Care: any activity in preparation for or in completion of Direct Patient Care."

"Paperwork: any activity concerned with writing or reading of records and other hospital matter."

"Communication: any activity of verbal communication in line of duty."

"Patient Escorting: any off-ward activity connected with transporting of patients."

"Errands: any off-ward activity connected with procurement or delivery of hospital materials."

"Clean Up: any activity whose purpose is to clean up or tidy, other than as a part of Direct Patient Care."

"Travel: any activity on the ward in which personnel were moving with an indiscernible purpose."

"Personal time: all other activities. These were considered nonproductive."

Sample.—The floors of the Osler Clinic (Medical) except for two floors which were essentialy restricted to Class I patients. Three floors a day were observed for a total of 22 observations for that day. The observations were made on 18 weekdays.

Instrument.*—Work sampling was chosen. One observer was used. Each floor would be observed each half hour but at a random time. Twenty-two observations per floor day were assured.

The index is the products of the number of patients present in a category times the average care time for the category. The result is an estimate of the patient care that will be given on the ward.

Statistical Analysis.—Seven sets of times of observed activities were presented for statistical analysis. The activity entitled "other" was formed by totaling the times for errands, patient escorting, cleanup, travel, and miscellaneous. The .8 index is used indicating that the period observed between 7 a.m. and 6 p.m. accounted for 80 percent of Direct Patient Care. A linear model was hypothesized ($Y_i = a + b_1 X_i + b_2 X_{2i} + b_3 X_{3i} + e_i$).

Y_i = time in activity on days
X_2 = census on day i
X_{3i} = index on day i (pt. class)
E_i = error on day i

Results.—The patient classification system provides a quantitative measure of nursing workload and thus a means of comparing workloads between two or more floors.

The patient classification system provides models of workloads that are of value to hospital administration.

Staffing implications included that staffing assignments will be more likely to meet ward nursing personnel needs. The index is a more refined measure of nursing workload and is more able to assess needs rather than the "feeling" of workload, i.e., light, heavy, or normal. Inequities can be evident by comparing index and staff size on various hospital wards. Elimination of inequities in staffing and the maintenance of necessary staff will improve work experience for students. Use of classification system is a better measure than the standard 3.2 nurse hours to patient day. Direct application of patient classifications include the use of a questionnaire to determine physical condition of each patient, use of classification to aid in work assignments, aid in supervision of personnel, aid in hospital evacuation plans.

STUDY IV

Fixed and controlled variable staffing are two systems that are adaptable to analytical models. The fixed staffing system means that the same number of personnel are present every day. The controlled variable staffing plan is that personnel are assigned to floors in proportion to floor workload. Under conditions where the number of personnel is sufficient to meet the total load presented, the variable staffing system will give better coverage than the fixed staffing system based on a probability formula. The assumptions are that the workload on a floor is normally and independently distributed. Since workload has been shown to be directly related to index, it is assumed that the workloads are independently distributed. The equation shows that the load is covered more frequently with controlled staffing, that the larger the variation of load, the better the controlled staffing system and the larger the number of floors the greater the savings in personnel.

The preceding analysis assumes perfect operating conditions. Therefore, a "game" was played over a 28-day period to simulate a controlled variable staffing system. The hours schedules were calculated. The index for each floor for 28 days was calculated. A pool of eight aides was created by subtracting the equivalent of eight day shift aides from the four floors. On the basis of hours scheduled and estimate of load for each day, floor aides were assigned to the floor with greatest need.

The criteria used to compare the two systems were the number of people necessary to meet the demands satisfactorily and the variation in differences between possible productive hours and workload between floors.

In implementing a controlled variable staffing plan, the error of estimate based upon data from work sampling was taken into consideration by calculating confidence intervals.

The conclusions drawn on the discussion are that the controlled variable staffing system has the potential to reduce personnel requirements and to better utilize personnel and that the error of estimation does not invalidate this conclusion.

Conclusions:

- The development of a feasible patient classification system from which models can be constructed that explain and estimate the nursing workload.
- Nursing workload is not a function of census alone.
- Hospital inpatient care costs are not a simple linear function of the number of patients cared for.
- Systems that react appropriately to the variation in demands are more efficient than systems insensitive to this variation.

Critique

This research study on a classification scheme for hospital inpatients has been used in many nurse staffing methodologies. Consequently, it is an important study and one whose impact has been great.

The general theoretical framework of the study resides in the knowledge needed about the act of the classification system itself and, in particular, the use of the abstraction ladder proposed by Hayakawa. The researcher carefully outlined the characteristics of a desirable classification scheme. The author's discussion of the approaches to the patient classification system in 1960 is thorough. The argument presenting the need for a classification system based upon elements of care is logical and forceful. Previous work on classification systems by E. Clausen, U.S. Army, by individuals of the USPHS at Manchester, Connecticut, and Pittsburgh (Pennsylvania) is briefly reviewed, but it is not critiqued.

The research consists of a series of four substudies. Three employed observations of patients. One included a questionnaire to nursing personnel about patients; one made use of work sampling of nursing activities. The fourth tested two types of staffing, variable and controlled, by the application of simulated models.

The researcher explained the selection of the work measurement technique for the study and included a short statement of sampling consideration for the first two substudies. Observation of patients was selected as the choice of data collection, since one could get the data readily. The researcher does not comment upon the distortion effect this observation may have had upon both patients and, in particular, upon staff activities.

Sample size for the first substudy was based upon the opinion of the nursing department representatives with whom the author was consulting. It was not based upon a consideration of usual variables that may enter into workload such as census and diagnosis. Sex, clinical service, and problem areas of patients were used. The problem areas of mobility, consciousness, disturbance, inadequate vision, and isolation were suggested by the research nurse on the project. Employing them makes sense. However, the classification of the nursing problems ignores the problems that deal with the psychological orientation of the patient and his family members, unless this is listed under "emotional disturbance," a misnomer. It also avoids the large instructional component that could be built into nursing practice. The identification of nursing problems can be built along a physiological continuum, or along a psychological continuum, or both. The philosophy of the nursing administration and the orientation of the staff will be reflected in the nature of the practice in which the staff engages. The classification scheme proposed in this study is highly reflective of a technical approach to practice.

In addition, there are two other features about the original sampling that are troubling. First, it is not reported how the problems were defined. The characteristics attached to each of these are not given until the questionnaire for nurses developed in the second study was described. Second, there was no sampling of a larger population to learn the distribution of these problems in "a normal patient population." One cannot assume that the problems are normally distributed; neither can one be assured that they occur singly. The question of how the patient with multiple problems was classified is not answered. An individual familiar with practice also knows by experience that nurses may not agree on placement of patients, for example, as to their level of consciousness, and that problems presented by patients do vary in time. When was the patient classified and what contributed to constancy?

The author made an attempt to obtain a stratified sample "grouping the patients according to their activities as nearly as possible, an equal number from each group." Proximity to each other was also thrown in. However, in spite of the careful attention given to this problem by the investigator and the defense he gave, one must raise the question of whether or not the sampling was truly representative of the population and whether or not a stratified random sample was obtained. The stratification was certainly not based upon the frequency with which the nursing problems occurred.

The observations upon which the patient classification system was built were obtained by one observer. The observer, his qualifications and training, are not given in the study. The activities he recorded are described in very general terms. There is no indication of how judgment about these elements is derived and how recorded. It would be impossible for a second person to use the scheme without specific directions and added information from the investigator. The elements are oriented toward physical care for the most part. They are gross elements with a large grouping for "miscellaneous service."

The second substudy made use of a questionnaire filled out by nursing personnel and developed in conjunction with the nursing staff. There is nothing reported to indicate whether nurses agreed in their response on items about the same patient or whether they would give the same response in a retest situation. Training of staff for its use is not described. There is no defense of validity of the items. Since the patient classification system was refined from the data obtained by the questionnaire, the lack of reliability of the data is a serious matter.

Validity was partly checked by the observations made on the patients themselves. Data by questionnaire were collected once a day. This assumes that the data about the patient obtained at that hour are characteristic of the patient during the 16 hours. No test was made to learn if the items checked by the nursing staff would be the same at 6 a.m., 3 p.m. or midnight, or if these would "average out." In other words, would the questionnaire data present the same general pattern of classification regardless of the hour of collection? Variation in daily nursing load is recognized (pp. 67 and 68). Is there a concomitant variation in hourly load as the patient's condition shifts from one category to another?

The author submitted the data collected to vigorous statistical testing and shows that significant differences in average care amount of time for each class of patient does exist at the hour collected; that there are no care requirement differences between patients of the two sexes; and that the classification system worked for medical, surgical, and ophthalmological patients.

The data for the third study dealing with work sampling of the nursing workload were collected by one observer using a standard approach and were reduced from 45 ward days to 34 days. This study was designed to test the estimate of patient care load, called the index, which is derived by multiplying the number of patients present in each class by the average care time for the class and totaling it. The author stated "that patient care comprises 30 percent of the total workload" (p. 65), drawing upon one master's thesis. He presented the variation in nursing care hours predicted for one nursing unit based upon the application of the classification scheme on one ward, pointing out the great effect of the class III patients. Dr. Flagle's theory of the Poisson distribution of this group's admission, based upon observed admission of this group, was discussed. The work sampling study was conducted to "determine the relationship of the total nursing workload to direct patient care load" (p. 76). The regression analysis for productive activity (the sum of the time of productive activities against the time of nonproductive, called personal time) on the index explained about 61 percent of the variation. When personnel hours are included in the equation it explains 80 percent.

The fact that an increase in the number of patients requiring technical care requires an increase in nursing time is obvious to most practitioners. What is omitted in care rendered to the patient is not dentified. What is not allowed for in the index was omitted in the classification scheme in the first place. This care is often omitted because most nurses do not perform it—the requirements for psychological care. On the other hand, it may well be that such care is inappropriate and too costly for some institutions and some patients.

The simulation of two types of staffing was described carefully. However, a major flaw in rationale is present. The pool for the variable staffing plan was created by the use of aides alone. If one accepts the fact that the major variation in load occurs because of the random movement of class III patients into the system, is it not reasonable to state that their needs, those of the most critically ill patients, may require professional care as well as nonprofessional attention? There appears to be an oversight as to the nature of the knowledge and skill requirements for these patients.

Connor's work, carefully and thoughtfully done, has made an impact upon staffing methodologies. Its merit is recognized. What is not recognized are its limitations. The looseness of definitions, the omissions of nursing problems and aspects of practice, the questions about the sampling, the lack of easily translated procedures, and the oversight about knowledge and skills needed for care and what patients require are justified criticisms. On the other hand, his statistical evidence cannot be denied. A system for classifying patients on the basis of physical care is supported. But the interpretation of what was *not done* is missing.

A12. Dodge, Joan S. "Cornell Study of Patients' Cognitive Needs." Graduate School of Business and Public Administration, Cornell University, Ithaca, New York, (CH-00091), (no date).

Review

This publication contains a series of short summaries dealing with the procedure and results of the research project. It is written for the individuals in participating hospitals who were interested or who made the research possible. Therefore, in this version much has been omitted from the basic research document.

The author gives the results of interviews with 127 patients (the working sample is 116), classified by sex and by clinical service: medical or surgical. A four part questionnaire was administered by interview. It was constructed in four parts to elicit information by means of the patient's responses. These responses were coded into four categories: cognitive clarity (factual information), nonfactual assurance (or emotional support), social interaction, and non-interactive needs. The patient's responses were broken down into specific units, each containing the expression of a single need. Following categorization, the responses were further coded to reflect subject matter. Scores were computed by counting the number of specific units (a single need) that fell into the four general categories and also into subject matter categories. A percentage score was calculated by dividing the subtotal of the category by the grand score for all four. For the subject categories, an *importance measure* was established by dividing the number of times the subject was mentioned by the total number of units in the category. Correlation scores were obtained for the rank ordering of these units (subjects) by sex and by type of clinical service.

Findings.—Fifty-two percent of the units reflected information needs of the patient. Of the other responses, 12 percent indicated nonfactual emotional support needs; 11 percent need for social interaction, and 25 percent for non-interactional needs (physical comfort). Because of the distribution, the investigator presented only the analysis pertaining to *cognitive needs*. Of the 101 different kinds of information desired by patients, 32 were expressed by least 10 percent of the patients. These dealt with diagnosis; seriousness of illness; etiology; concerns of the future, time, and feeling; kind of care received and needed; results of procedures; and the medical staff.

Men attributed more importance to knowing the total length of time involved in their hospitalization and illness and in the specific modifications required than did women. Women were more interested than men in knowing the chances of reoccurrence, the effects of medications and the requirements of care.

No significant difference was found between medical and surgical patients in the total amounts of information desired. The real difference was in how the two groups ordered the categories. Surgical patients were interested in learning details of the surgery and placed emphasis upon activity restriction and care given to them. Medical patients placed more importance on diagnostic procedures and the results of these and upon learning self-care and the effects of medications.

Critique

There has been no full exploration of the question relative to what patients want to know about their illness and hospitalization. Knowledge about this question could be useful in predicting the type of staff required to give the information. A number of assumptions have been made about the need to orient patients to their role.

The methodology is only briefly described. A few samples of questions are given to illustrate the involvement of the interview. However, the author does not include a copy of it or the rationale underlying its development. (She explains its omission in that this report is not intended to be the formal research report but, instead, serves another purpose.) There is no report of the validity or reliability of the instrument.

Analysis is by a comparison of percentages and an ordering of subjects by an *importance measure*. The statistical treatment appears satisfactory. The interpretation is logical and cautious.

Since the research report in not detailed, it is diffiult to make any evaluation of the study's contribution. The description of the behavior of the patients, their responses of what they wish to know, is highly useful in planning staffing patterns.

A13. Drew, Jacqueline A. "Techniques Used to Determine Quality of Hospital Nursing Care." Unpublished paper. (W-203) Stanford Research Institute, Menlo Park, California, (no date).

Review

Purpose.—To learn what hospitals in one area are doing with respect to quality control of nursing.

Sample.—Twenty-six non-Federal Government and other nonprofit short-term general hospitals in San Francisco, San Mateo, and Santa Clara. Because of the absence of the key respondent, four of these hospitals were not included in the survey.

Instruments.—Personal interviews were conducted by the author with the director of nursing, her assistants or the director of inservice education. The average interview lasted 1 hour, varying from ½ hour to 3 hours.

In five hospitals, visits were made to some of the floors to see technique in use.

A formal questionnaire was used in the interview. The interview guide included questions about use of complaints from patients, doctors, and others. Information regarding use of rounds, means of checking procedure and patient records was obtained. The respondent was given opportunity to describe special methods in use by each hospital.

Procedure.—The information relating to techniques used to determine quality of hospital nursing care is analyzed and presented in six categories as follows: information solicited by hospitals, unsolicited information, rounds of nursing units, testing nurses, patients and other records, and other information sources.

Results.—All hospitals expressed concern about quality of care given. Each hospital was using at least one of the 42 special methods of evaluation. The most widely used technique, questionnaire to patients, was used in nine hospitals. Twenty-four of the special techniques were each used by only 4.7 percent of the hospitals. Many directors seemed dissatisfied with the methods being used in their hospitals. There did not appear to be a great deal of exchange of ideas between hospitals. There seemed to be no pattern by hospital size. There was much stress on the use of inservice education programs for demonstrating new equipment but less interest in testing personnel for clinical knowledge base and finding corrective measures. Directors were more concerned about personnel and staffing problems than with patient care. There was a lack of a uniform and complete system of recording the happenings on the nursing unit. The stimulus for setting up a uniform and complete system of quality control should come from the professional nurse.

Critique

The ultimate aim of nursing service is to provide nursing care characterized as beneficial to patients and possessing a quality that is acceptable. This survey by Drew is an attempt to find out the techniques used by hospitals in one geographic area to assess quality of care. This study is highly important since the work of Blumberg and Drew is drawn upon by CASH and others adopting that type of approach. Unfortunately, Drew does not build in this paper a sound rationale for the survey. The article to which she referred in this report is likewise limited in its presenting the connection between care, quality, controls, and effect. The operational definition she presented indirectly can be questioned as to its validity as well as to whether or not it lends itself to measurement.

The data collection tool employed in this survey is the interview, utilizing a questionnaire. Although the method may be sound, there is no data included that pertains to the purpose, development of the questionnaire, its testing or its administration. The data obtained by the interviews are analyzed into categories that apparently emerged as the replies were reviewed. Evidence that a reliability check was built in on this classification is missing. The sample of individuals included in the interviews was probably large enough, but the description of it is not presented in detail.

The author described the techniques used in hospitals in straightforward style. However, the implications of the results and the ideas for attacking the problem are not discussed. The report, therefore, is also disappointing in what it offers to the person genuinely concerned about staffing, the monitoring of performance and its results.

A14. Dyson, Barbara J. "A Study to Determine the Most Effective Method of Accomplishing Administrative Functions on the Nursing Units of Spohn Hospital, Corpus Christi, Texas." Unpublished Master's Thesis, Baylor University, Waco, Texas, August 1968.

Review

Sample.—Spohn Hospital is a 300 bed Catholic hospital in Corpus Christi, Texas. The two nursing units observed were classified as mixed general and surgical wards. Most of the accommodations were private rooms and were used for Medicare admissions because of the decreased room cost. Forty-four to 50 percent of the patients were 65 years of age or older. Both units were assigned one full-time registered nurse in addition to the head nurse. Licensed vocational nurses were assigned to charge duty on these units from 3:15 to 11:00. During the period of observation, 19 to 23 doctors appeared daily on each ward. Spohn Hospital utilizes a ward clerk and a ward clerk aide.

Procedure.—A guided tour through the hospital enabled the observer to view the administrative areas and numerous departments in relation to the nursing units. An obvious problem was the inadequacy of elevator service and pneumatic tube delivery system to the study wards.

The observer spent 10 days collecting activity data on selected nursing units.

Directors of the allied departments actively involved with the nursing units were interviewed.

A notation of the head nurses' activities was made at spaced intervals throughout the shift.

The observer noted the activities of the ward clerk on one unit. The ward clerk on the other unit recorded a detailed list of their activities.

Results.—There were no clearly defined lines of authority in the nursing department. There were no established criteria in which assignments for different levels of personnel could be determined.

Problem area most frequently mentioned during the interviews with department directors was concern for breakdown in communication. Requisitions frequently contradicted what was requisitioned the previous day. Two or more phone calls followed written requisitions for equipment repair. Errors were caused by trying to do too much too fast. Incomplete requisitions caused unnecessary delay.

Activity observations on the two study wards revealed that most of the direct patient care was performed by the licensed vocational nurse and nurse's aide.

Personal time was excluded from the analysis of the head nurses' activities. One-third to one-half of the recorded activities could be performed by someone other than a medically trained individual.

The activity lists submitted by the ward clerks were comparable to the itemized list observed. However, only one phone call was recorded on the lists that were submitted. Phone calls occurred on the average of one call every 4 minutes on the ward observed. The ward clerk aide was given assignments from at least five persons (head nurse, licensed vocational nurse, part-time registered nurse, and a senior professional nurse). Seventy-five percent of her duties involved trips off the ward. She often made a second trip to the same area within a 5 to 15 minute period.

Alternative methods for accomplishing administrative functions on the nursing units are suggested. This report lists advantages and disadvantages of the ward clerk and ward clerk aide, hospital information system, and unit manager plan.

In conclusion the author states that the establishment of a unit manager system is the most effective method of accomplishing administrative functions on the nursing units at Spohn Hospital.

Critique

Any study of nurse staffing requirement entails the analysis of administrative functions and their organization and placement, either in existing positions or in new positions. This master's thesis is an effort to determine the most effective method of handling administrative functions within a nursing unit.

The thesis is frankly a problemistic search for an answer to a question for one particular hospital. There is a limited literature review, drawing upon a few studies concerned with the unit-manager system.

The author collected a mass of data about the hospital and the two nursing units under study: the percentage distribution of patients by age, the number of nursing service personnel, the number of nursing hours available by category, the organization structure of the hospital, and the position control program for each unit. How these data are used in the study itself is not clear. Neither are the tools and observation techniques adequately described. The result is an inadequate drawing together of the data assembled and relating it to the alternatives and to the recommendations. Therefore, the thesis does not serve as a useful model of studying administrative functions and arriving at a logical conclusion of how they can be handled.

The idea of studying the activities of the head nurse, ward clerk, and ward aides in itself is sound. One is puzzled, however, about the administrative functions carried in other positions. The fact that licensed practical nurses (LPN) serve as charge nurses on the evening and night tours has been overlooked. Certainly there are administrative functions at these times of day.

The value of the thesis resides in its attempt to examine the question. It serves more as a model of how not to proceed than how to proceed.

A15. Feyerherm, A.M. "Measures of Hospital Patient Care Loads." Final Research Report. (GM 10344 and NU 00064-02), Kansas State University, Manhattan, Kansas, December 1964.

Review

Purpose.—The intent of this investigation was to develop formulas that could predict patient care loads for personnel on various type of hospital nursing units. The author experienced difficulty in two areas: the precise definitions of a specific unit of work and the variables influencing time to perfrom tasks, which include not only the amount of work but also the number of personnel available to do it.

A factor causing day-to-day changes in activity patterns is workload. If workload increases, certain activities should require more time, assuming the same staff time is available. An instrument is developed that shows that time spent in various activities depends on variables directly or indirectly related to workload, such as types of patients on a unit and the number of nursing personnel on duty. By specifying minimal time needed for certain activities under an increasing workload, the number of personnel required could be predicted.

Two sets of equations were developed for nurses and two sets for aides. The care-level set involved daily counts of patients in defined care-level categories. The hospital-day set involved daily counts of patients with various lengths of stay. A comparison of these sets was done to determine which set was a more accurate predictor of workload.

Variables.—The time spent in various activities was the dependent variable. The criteria used in the development of activity categories were as follows: an observer should find it unnecessary to enter patients' rooms, the activity should be easily identified, location of an individual on the unit should help identify the activity being performed, and combination of categories should be possible. Five major activities and 13 minor categories were defined on the basis of studies by Feyerherm and Kirk, 1964, and Aydelotte and Tener, 1960. The five minor categories included under the major category of *physical* are: all activities inside a patient's room and walking or transporting a patient in hallways, preparations, cleaning; walking empty, and walking laden. The major category, *delivery*, was the activity involved with the patient in labor or in the delivery room. The third major category of activities was *clerical* and included the three minor activity areas of: chart and kardex reading and recording, preparing data for this research project, writing and reading notes, and preparing requisitions. The fourth major category, *communication,* included information exchange, shift change, and other conferences. *Standby time,* the fifth, was standby on the unit and out of area activity such as lunch, coffee break, errands, and trips to other departments. Daily estimates for time spent in the various activities were obtained using work sampling techniques. The total time spent in each category, measured in minutes for each day, must total 480 times the number of nurses and 480 times the number of aides.

The independent variables were patient requirements as measured by care levels and length of stay. Adaptation of definitions used by Aydolotte and Tener, 1960, were used to arrive at criteria for minimal care, intermediate care, and high care requirements. For a given day, the total number of patients must equal the sum of the total number of patients in each category. The length of stay categories were consistent with those commonly used for assessing room changes. First day patients are those patients present in the hospital for less than 24 hours. Patients admitted shortly after midnight were first-day patients for nearly 24 hours since records were changed shortly before midnight. The second length of stay category was the second to the fourth day based on the difference between the calendar day and day of entry. The fifth day category consists of patients hospitalized for five or more days.

For nurseries, infants were classified as premature, breast fed, or bottle fed to reflect care requirements. Neither infants nor geriatrics were classified according to length of stay since the hospital day appeared to have little effect on activity patterns for these patients.

Sample.—Voluntary, nonteaching, and general hospitals participated in this study. These hospitals were governed by church-related corporations and were located in a Kansas community. Essentially the same medical staff served both hospitals. The units studied in one hospital were as follows: one medical unit, one medical and surgical unit, one obstetrical unit, one nursery, and two geriatric floors. Institution Two provided such study units as: two medical-surgical units, two obstetrical units, two nurseries, and three geriatric units. Aides were not assigned housekeeping in public areas and food was brought to the floor by dietary personnel but was served by nursing personnel. No unit had a clerk.

Data collection.—Each medical, medical-surgical, and obstetrical unit kept a special card file showing care level and hospital day for each patient. The details of the classification scheme were attached to each file. A summary form was filled in at the end of each shift to determine patients' requirements (three levels) and length of stay.

A nurse, recently graduated and new to the community, was used to collect data about time spent in various nursing categories. The work sampling technique (Torgusen, 1959) was used. Seventy days of observation were carried out in each institution. Twenty-three days of observation were done in two geriatric units. Ten Mondays, 10 Tuesdays, 10 Wednesdays, etc., were sampled to total 70 days of sampling to assure a study of a variety of staffing patterns. Sampling was carried out over a 9-month period to insure variation in the composition of patient population. A complete tour of all the units in each hospital took 12 minutes. The observer made four tours per hour between 7 a.m. and 3 p.m. totaling 32 observations per aide or nurse a day. Units were covered in random order, the description of which is in detail.

Use of instruments.—Preliminary investigation was done to explore the effects of certain combinations of independent variables (care requirement and length of stay). The Care-Level Set of equations for nurses had the following form:

$$\begin{aligned}T_i(N) = {} & b_{0i} + b_{1i}P(T) + b_{2i}P(M) + b_{3i}P(H) + b_{4i}N \\ & + b_{5i}A + b_{6i}N \cdot A + b_{7i}N^2 + b_{8i}A^2 + b_{9i}P^2(T) \\ & + b_{10,i}N \cdot P(T);\end{aligned}$$

$i =$ I, II, III, IV, V (Activity Categories) where $T_i(N) =$ Predicted total minutes spent by nurses on the day shift, performing the i (th) activity, and b_{0I}, b_{1I}, . . . , $b_{10,I}$($i = I, II, III, IV, V$) are sets of constants for the equations.

Specific values for each set of constants were determined by applying the method of least squares. Tests of significance, developed in the general theory of multiple regression, were used to delete terms from the general equation. Terms were retained only if one or more coefficients in the set of five equations was significant at the 10 percent significance level. Because this methodology involves a large number of multiple regression analyses, it is only practical when a high-speed computer is available.

The prediction equation for time spent in Activity 1 (Physical) on the medical unit was $T(N) = -114 = 3P(T) - 2P(M) + 12P(H) + 160N$. The values of the coefficients of the overall general equation that were used in this formula were $b_{0,I} = -114$ minutes, $b_{1,I} = 3$ minutes/patient, $b_{2,I} = -2$ minutes/patient, $b_{3,I} = 12$ minutes/patient, $b_{4,I} = 160$ minutes per nurse. The remaining b–values were set to zero. These coefficients were based on sample evidence, sample averages, and were subject to sampling variation.

The mathematical models and statistical methods are described in terms of care-level set for nurses on the medical unit, interrelations among equations of a set, definitions of certain coefficients, hospital-day set for aides on the medical unit, nonlinear terms, nursing and geriatric units, and statistical concepts. Equations similar to the previous equation for Activity I were developed for each activity for nurses on the medical unit. The interrelations among equations of a set indicate the behavior of a dynamic system. The system of four equations (using Activity I, III, IV, and V) describes mathematically the interchange of time spent in four activities; these values change from day-to-day. The activity in one area cannot increase without an equivalent decrease in another area. Certain coefficients of the general equation are defined so that the number of minutes added to the activity by a certain care level of patient can be determined. The hospital-day set for aides on the medical unit is the same general form as that used for nurses. The significance of nonlinear terms in these equations is described. Equations for the nursing and geriatric units were more simple. Certain statistical concepts such as R^2 and the asterisk are explained. Nine tables summarize all the information obtained in this study.

The analysis of prediction equations include the study of the effect on the addition of one nurse, one aide, one patient-nurse activity, and one patient-aide activity. The change in allocation of time that occurred when a nurse or aide was added was constant and is described in detail. The census is interpreted as the value of care-level. The hospital day was held constant.

A picture of activity patterns that occur for various combinations of care-level requirements and hospital-day is presented in 12 tables. Minutes per patient were used to measure time spent in physical activities and clerical work. A method for reading tables is described. The use of these tables to predict patterns on other units will be more accurate if physical and clerical activities are used and workload is higher. The equations have the greatest precision when values for the independent variable (patient requirements and care level) are closest to their respective means.

Communication consumes a sizeable amount of time on a nursing unit. Data were collected to estimate the amount of time used by nurses and aides for communication across skill levels. Nurses tend to spend an average of 30 minutes per day per nurse in conversation with people who are not a part of the nursing team on their unit. Aides spend little time in conversation with people not assigned to their unit. Nurses tend to spend more time in communication groups with one or more aides than in situations where only unit nurses are present.

An increase in workload shows an increase in Activity I and/or II and/or III (physical, delivery, clerical). The criterion established to determine when extra help was needed was that time spent in Activity IV, or V (communication and standby). The correspondent in communication and standby should be greater than or equal to 25 percent of the nurse's time and 16 percent of the aide's time. Graphs show whether sufficient nurses and aides were on duty to care for a given combination of patients. The graphs can be used to suggest the number of nurses and aides needed as a base staff and to determine whether replacements are needed for sick leave or time off. Suggestions for staffing medical units, medical-surgical units, obstetric units, nursery, and geriatric units are made from interpretations of the graphs.

A number of research studies are mentioned as studying the problem of workload measurement and staff size.

Conclusions.—The sets of equations used as mathematical models to describe changes in activity patterns for changes in workloads provide a basis for studying relationships among pertinent variables.

In a set of prediction equations, the terms retained, on the basis of statistical tests of significance will depend on existing conditions on a nursing unit at the time of data collection. These conditions are such variables as excessive workload or low census.

Nurses and aides respond to an increase in census by increasing the time spent in physical, delivery on obstetrics, and clerical activities and decreasing their time spent in oral communication and/or standby activities. Some exceptions occurred in this study.

Both care-level and hospital-day variables have a significant effect on activity patterns of nurses and aides. Some effects may go undetected on some units.

There was no substantial evidence for choosing care-level variables over hospital-day variables in predicting activity patterns. The care-level variable or hospital-day variable as predictors varied in precision on different units for some types of activities.

The results of this study together with the precision of hospital-day categories suggest that the hospital day be used for predicting activity patterns and workload limits.

The time allocated for care of breast fed or bottle fed babies is not different in the nursery but the effect of one premature infant is quite pronounced.

Based on the graphs, workload limits are reached when the total time for communication and standby activities has been reduced below 2 hours per nurse and 1.25 hours per aide.

One nurse with sufficient help from aides can care for 15 patients on a medical or medical-surgical unit. One aide can care for five to nine patients depending on the amount of time nurses spend doing aides' work. A staffing pattern is presented that is based on the presence of a charge nurse freed of clerical work so she is able to work alongside the aide. In both staffing patterns, it is assumed that other nurses will do aides' work when necessary since the census may be such that more professional time is available for use than is needed.

Results for obstetrical units show that one nurse with the help of one aide can care for seven patients, three of which are first day patients. Ten patients can be cared for by one aide. In nurseries, one nurse can care for nine infants, and two nurses and one aide can care for 15 infants including one premature infant.

Critique

Few references to this study have been seen—an unfortunate fact since the study is provocative and useful in considering questions of nurse staffing. The author has made an attempt, a highly respectable one, to relate selected patient variables to nursing workload and to predict staffing requirements from specific data. Therefore, the research is highly relevant to nurse staffing. Feyerherm's conclusions are applicable in planning for staffing of nursing units similar to those he studied.

The two variables Feyerherm selected for predictive purposes are patient classification and day in hospital. He made the assumption that there is a minimal time needed for the performance of nursing activities and that the number of personnel required for staffing is based on the total time required to perform the activities required for a patient population. Therefore, changes in patient population, especially shifts from minimal care to extensive care, unless additional staff time is made available, will affect the activities performed by the staff. The change will be in one of three ways: (a) a reduction of time spent on activities within the minor categories, (b) by omission of nursing care to selected patients, or (c) by the staff working at a faster pace. Feyerherm states that not all of these are feasible or desirable. In fact, he proposes that when total time spent in communication and standby time falls below a certain point, workload limits have been reached. No rationale is proposed for the time limit selected, but the concept is worth exploring further.

Data used in this study are collected by survey methods and work sampling. The research draws upon previous work of the author and the Iowa Study. Reviews of other studies are included but are not specifically related to the present investigation. The categories of activities used in the work sampling are described. The patient classification scheme is very simple, employs a principle of exclusion, and basically makes sense in that it uses one dimension only, *dependency*. Variables are defined operationally. Unfortunately, no examples of the various data collection tools are included in the report. Consequently, no judgment can be made about their reproducibility. All work sampling data were collected by one observer whose training was not reported. The reliability of data collected by one person, at 15 minute intervals over 8-hour periods, was not defended. However, the sampling procedure was standard, random, and adequate. Two different institutions were used as study sites. The selected characteristics of each were pictured.

The study appears to have been carefully designed and conducted. Many tables giving specific data are included. Several mathematical models are proposed based upon time, type of activity, and sets of constants derived through statistical methods. These are well explained.

This study is useful for two purposes. First, it is an excellent demonstration of the problems entailed in describing a unit of nursing work. The variation in time to perform nursing work is due to many influences, such as availability of the patient and of materials, motivation of staff member, and the press of priorities of other work. Second, the conclusions given by the author are helpful in understanding the problem of prediction and the effects of change in patient population. An interesting idea Feyerherm proposes is that the operationally defined hospital day rather than patient class be used as a predictor. Problems of the reliability and validity of classification systems could thereby be avoided.

A16. Flagle, Charles D. "Progress Report—April 1, 1963, to March 31, 1964." (HM 00279-01 and GM 05537-05.) Operations Research Division, Johns Hopkins Hospital, Baltimore, Maryland, (no date).

Review

(This annotation is a brief review of the research program summary of the Nursing Studies and Administrative Studies.)

A. *Implementation of Staffing Procedures*
by John P. Young, Ph.D.

Purpose.—To extend the routine administrative use of the patient classification system and staffing procedures to all inpatient areas except pediatrics and psychiatry. The ultimate purpose is to have the computer indicate the optimal daily allocation of nursing personnel based on detailed information from the unit and assistant director for each service.

Procedure.—Each head nurse completes a Patient Classification Form based on Conner's classification system, which categorized patients on degree of self-sufficiency. The supervisor combines the information on the form and computes the amount of direct care required by using the equation: ($I = .5\ N_1 + 1.0\ N_2 + 2.5\ N_3$) where N_1, N_2, and N_3 are the number of patients in self, partial, and total care categories. The total nursing load is then equal to $I + 20$ hours. The load is matched with the number of nursing hours scheduled for the next day and shows either a shortage or a surplus of hours.

"A condensed version of the initial direct care studies and work sampling studies, together with detailed explanation of procedures and computation has been published as a separate report."

B. *Multiple Assignment Model for Staffing a Nursing Unit*
by Harvey Wolfe

Purpose.—To yield an estimate of required nursing hours and personnel mix that will be optimal with respect to both the number of individuals necessary to satisfy patients' needs and the qualifications each of these individuals should possess.

Procedure.—Exploration of linear programing techniques that permit the placing of a value upon each personnel-task interaction and allow the introduction of qualitative measures upon which to base staffing decisions.

The multiple assignment problem is identical to the simple assignment problem (there exists a set of tasks and a number of individuals such that there exists a cost or value for each individual to perform each task) except that it permits the assignment of any number of tasks to an individual. This change presents mathematical difficulties since a solution must be in integers (individuals cannot be hired in fractions). The model using integer linear programing is not feasible practically. The heuristic algorithm has been developed to approximate the solution (in the region of the minimum) of the multiple assignment model.

In order to calculate the parameters, psychological and physical measurement techniques were used to arrive at interaction values based on education, experience, and qualitative ability of various classifications of nursing personnel. The quantitative estimates are based on work sampling and patient classification.

A typical solution for a 26-bed nursing unit in internal medicine with 12 self-care patients, 11 partial care, and three intensive care would call for two head nurses, two LPNs, four aides and one ward clerk. This solution indicates that in order to give good quality nursing care, two nurses with extensive experience and exceptional judgment are required. Individuals with technical type training (LPNs and aides) can perform the other tasks. The evaluation of judgments of administrators in nursing, regarding what classification should perform what tasks, yields a solution that clearly distinguishes between the skills required.

"This allocation model provides a solution recommending that staff can qualitatively and quantitatively meet the needs of a nursing unit." It leaves the assignment of available personnel to the supervisor but provides information as to the qualitative and quantitative requirements that are needed.

C. *Pediatric Nursing Care*

by John P. Young

Purpose.—To show that the patient classification system and nurse staffing procedures would be different for pediatric patients.

Procedure.—Eight observers were used to record daily the amount of care provided over 10 weeks on 600 patient days on four units.

With the assistance of this pediatric nursing staff, 12 primary factors were identified as reflecting the direct nursing care requirements. Each factor was subdivided to comprise a patient condition profile. The amount of direct care for each type of patient was recorded.

It was found that pediatric patients' conditions could not be grouped into distinct categories. The condition profile ranged over a continuum. A multivariate regression analysis was used to obtain coefficients that actually provide the amount of direct care time.

A regression analysis showed no significant correlation between daily census and amount of direct care.

D. *Redefinition of Nursing Responsibilities on the Quality of Nursing Care*

by Harvey Wolfe

Purpose.—To examine the organization of a nursing unit at the Johns Hopkins Hospital in order to explore the role of a clinician or nurse specialist, to suggest an organization that would improve the quality of nursing care, and to design an experimental unit to determine the effectiveness of the suggested changes.

Procedure.—A committee composed of nurses, an administrator, a physician, and an operations researcher defined the functions of the administrative nurse practitioner on the basis of operations research and observations of other hospitals. This nurse is responsible for all patient care given on her unit during all shifts. Her care plan is to be followed by the charge nurse when she is not on the unit. The assistant director, with additional secretarial help, will supervise the administrative nurse practitioner. Using the concept that a nonnurse can relieve the nurse of clerical and administrative costs, the functions of the nursing unit assistant are defined. She was to be directly answerable to the administrative nurse practitioner.

The change of the organization structure for the development of experimental unit required the elimination of the head nurse and ward clerk and a restriction on the movement of employees from unit to unit. Scheduling of personnel was based on the presently used Patient Classification Scheme.

Sample.—The factors that affect quality of care were determined from a questionnaire sent to 247 persons. The 139 replies represented 35 States and persons acknowledged to be interested and well informed as to current developments within the profession.

Results.—The results of these questionnaires will be reported in a later publication. These factors when defined and analyzed will be mathematically combined into a single measure of quality that can be used to differentiate the quality of care given on the experimental unit from that of a control unit.

E. *Dynamics of Direct Patient Care*
by Ronald L. Gue

Purpose.—To predict the effect on nursing response to patient care and needs of changing the number of nurses available for direct patient care. This study examines direct nurse-patient communication as it relates to the immediate control of the patient and his state of health.

Sample.—Data collection yielded 6,000 observations taken over a period of several weeks on a private patient area and on a surgical ward area.

Procedure.—"Analysis of the data indicated that the stochastic process generated by the demand for direct patient care and a group of patients may be approximately by a Poisson process."

F. *Logistical Support of Patient Care*
by John P. Young

Purpose.—To study the efficiency of the supply system.

Procedure.—A thorough study of all items in central supply, their usage rates and the stock levels on the individual units, was conducted. Optimum levels were determined such that the number of times the demand exceeds the inventory level is minimized and the required space does not exceed what is available. A computer was used for rapid determination of inventory levels.

Findings.—Many shortages were alleviated and the number of calls per day was reduced to 3.47 from 11.23.

G. *Study of the Medication System in Hospital Inpatient Services*
by Richard K. C. Hsieh

Purpose.—To increase the precision of the medication procedure, to reduce nursing time spent in transcription, and to provide a useful record of medication.

A proposed system was devised on the basis of existing procedures. An example of the computer printout is given.

H. *Admission Procedures and Control of Inpatient Census*
by John P. Young

Purpose.—To improve the stability and predictability of hospital inpatient census through the effective control of waiting lists and elective admissions.

The expected census level, the number of patients on a "call list," is analyzed and presented in "A Queuing Theory Approach to the Control of Hospital Inpatient Census."

Current research is attempting to extend the analysis of many wards. This includes the flow of patients into each unit, the effects of overflow, and the allocation of beds for emergency admissions.

Length of stay for patients in various diagnostic groupings and pay status has been determined.

Critique

This is a report of the progress of several studies carried out at the Johns Hopkins medical center. The studies relevant to nurse staffing in general nursing units, Young's work *Implementation of Staffing Procedures* and Wolfe's *Multiple Assignment Model for Staffing a Nursing Unit* and *Redefinition of Nursing Responsibilities on the Quality of Nursing Care,* are reviewed and critiqued as completed reports elsewhere in this section.

The separate studies as they are described in this progress report are too brief to critique. The value of the progress report, other than the original purpose for which it was intended, is that it presents in capsule form a picture of a number of studies being carried out concurrently in the same institution. As such, the progress report depicts the interrelatedness of the systems within a large institution and the ways by which a program of studies can be brought to bear on problems existing in different parts of the total hospital or nursing system.

A17. Freeman, John R., and Smalley, Harold E. "An Objective Basis for Inpatient Nursing Unit Design." An interim research report, (HM 00529). Medical College of Georgia, Augusta, Georgia, March 1968.

Review

Purpose.—The overall objective of the study is the development of quantitative methods for the evaluation of alternative inpatient nursing unit designs. The five specific objectives are concerned with model development that describes the employee traffic on a nursing unit and the prediction of costs of traffic patterns created by designs, cost construction estimate modification, evaluation of design, and application to varying nursing units.

Hypothesis.—One hypothesis is proposed: "the frequencies of nursing travel between all pairs of points on the nursing unit may be expressed as functions of the patient population being served."

Design, instruments, and procedure.—Data upon which the results are based are derived upon observations gathered from 7 a.m. to 3 p.m. on medical-surgical patients housed on two nursing units. These were nursing units in a short-term voluntary hospital and were uncomplicated in communication mechanisms. The assumption was made "that a trip *observed* is a trip *required*." Procedural steps were well delineated. The study hospital and the units were selected on the basis of five criteria: • willingness of officials to participate, • opportunity for observation in a wide variety of settings, • appropriate observation posts on nursing units, • sample environment, and • an accredited, short-term, general voluntary hospital, with known employee-patient ratio, length of stay, and service offered.

The nursing units selected were two "L" shaped, 40 and 41 bed units, almost identical. One housed medical-surgical patients; the other, surgical patients only. The units are depicted as simple in communication system.

A preliminary observation period was used to identify and define the various functional points from which travel emanated or ended, to test recording forms, and to acquaint the observer with the personnel and their category.

Data were collected in such a manner that every trip by every member of the nursing staff for 7 full days (7 a.m.–3 p.m.) was observed and recorded. The days were not consecutive. This allowed a greater variety of patients in the sample. Only two classifications of personnel were used: (a) nurses, and (b) aides and clerks.

In addition to travel, data were gathered on: (a) number of employees in each category; and (b) classification of patients as medical or surgical and by level of care required: total care, partial care, or self-care. The definitions for the latter were based on the scheme developed by Connor. The total data included observations for 367 patient-days and 16,308 trips.

The development of the stochastic model for nursing travel followed that used by Freeman previously. In the model development, the authors engaged first in simplifying the data. This was done by developing the model in terms of traffic between pairs of functional points, combining other pairs into a single point, and eliminating pairs from consideration since they contributed little to the data (1.17 percent of the study data). The final reduction of functional points was from nine to six, plus the patient rooms. The total number of pairs of points remaining in the model was:

$$\frac{(6+R)\,(6+R-1)}{2}-\frac{5(4)}{2}=\frac{10+11R+R^2.}{2}$$

The final set of observations was reduced, through the combining and eliminating procedure, to 13,788.

The data were examined first to learn if the trips involving private patient rooms could be described adequately by the Poisson distribution (drawing upon work by Gue). Preliminary analysis showed that trips between the nurses' station and a patient room containing a particular category of patient were not based on such a variable. This finding led the investigators to combine types of trips involving patient rooms into categories, all involving "service areas." Four of these categories were of such nature that a trip in one direction is almost invariably followed by a trip in the other, compounding the problem. The authors, applying logic derived from Gue's work on demands for service, concluded that for these categories of trips, the distribution is formed by multiplying a Poisson-distributed random variable by two. They, therefore, divided the readings on these four categories by two and tested them and the other trip categories by means of X^2 goodness of fit tests. None of the categories was rejected.

Tests of significance for differences between trip categories and the clinical dimensions (medical or surgical) and level of care were conducted as designed by Cox. A number of significant differences were found as well as a number of insignificant ones. The categories for which *no significant differences* were found resulted in a pooling of the data for model building, in that revision of the means for the trip frequencies was done through pooling data. These insignificant differences were as follows: • all medical patients, in the trips to the clean supply area; • all medical patients, in trips to the laundry chute; • total care, medical and surgical patients, total care and partial care in trips to the kitchen; • medical and surgical patients, partial care, in trips to the utility room; and • all patients, except self-care, in trips to the elevator.

The observed frequencies of trips involving nonprivate patient rooms were likewise compared "with hypothetical frequencies based upon the assumption that a room with n patients requires the same number of trips as n private rooms, each containing one of the n patients." The same test (Cox's) was applied. A significant difference between private and nonprivate rooms was found only for the trip between the nurses' station and the patient rooms. As the number of patients assigned to a single room increases, the percent of trips that would have been made if the patients were in single rooms decreases. However, the pattern suggests that the *degree* of reduction decreases as the number of patients assigned increases.

It was hypothesized that the expected frequency of trips between pairs of patient rooms "is proportional to the sum of the expected frequencies of the trips between any patient room and all other rooms or the nursing station, and that the constant of proportionality is a function of the distance between the rooms." Each patient room was ranked with respect to distance from the nurses' station in either direction and then taking the difference between the ranks of these two rooms as the measure of distance between them. Observed frequencies of travel between all pairs of rooms were compared with the expected frequencies of trips between the nursing station and the two rooms, the comparison being classified according to distance between pairs of rooms. Study data allowed 14 distances. Comparisons were made by use of linear regression equation to test for proportionality and then analysis of variance for significant differences. The results indicate that a distinct relationship exists between the constant of proportionality of trips and the distance measurement. In general, the greater the distance between two rooms, the fewer the number of trips.

Two other elements for the building of the model were then examined as parts of the model: • trips between nurses' station and patient rooms, and • between nurses' station and supply areas. The first estimator was derived from the work previously done (a difference between the two quantities) and the second by testing if the frequency of trips between the two functional points (nurses' station and service area) was proportional to the total number of trips between the two points. Regression lines were computed, showing that, with the exception of two, the clean supply room and the elevator, the equations were significant. These two were assumed as meeting the requirements of a Poisson distribution. The five cases involving the service points were tested to learn how many fell within 95 percent confidence intervals. All but that of the kitchen met the confidence requirements.

As a result of these tests, the authors accepted the general hypothesis and the model they constructed.

They then applied the model and made calculation for six inpatient designs, with the intent of showing comparisons in travel frequencies. The six designs were • all private rooms, single corridor: • all two-man rooms, single corridor; • all four-man rooms, single corridor; • double corridor; • T-shaped unit; and • circular unit. The latter three were included to show differences in shape, since they have the same number of patients per room. Based upon logic, assumptions and adjustments were made about patient population, effects of the elimination service points, and reduced occupancy rates. Direct costs for travel and construction were calculated, drawing upon personnel and cost studies that had been done in the Atlanta area. In combining data about the two variables relative to costs, the figures were converted to a per patient day cost. Application of cost data for the Atlanta area showed differences in the cost of travel and construction per patient day, the double corridor two-bed room being the least costly, the all private room, single corridor the most costly.

Conclusions.—The authors conclude that "the frequency of travel between a particular patient room and any other functional point on the nursing unit was shown to follow a compound Poisson distribution with mean value being a linear combination of the number of patients in the room who fall in the six patient categories."

"Travel between all pairs of patient rooms separated by a particular distance was shown to follow a compound Poisson distribution with mean value being proportional to the sum of the number of trips between each of the rooms and any other room or the nurses' station." The constant of proportionality for this relationship decreases as distance between rooms increases. Travel between the nurses' station and any service points (other than patient rooms) is proportional to total trips between that point and all patient rooms.

Critique

Cost of the travel of employees in delivery of nursing care and its relationship to type of design on a nursing unit is a worthwhile problem, especially if one recognizes that yearly employee costs approximate a high proportion of the total original cost of the building. The authors have addressed themselves to this question in a logical fashion.

There is an attempt to utilize other research findings. The authors referred to the studies of design and cost conducted by Souder, Thompson, and Pelletier, the Neuffield Provincial Hospital Trust, Gue, Jelinek, Camp, and McLaughlin. However, they do not draw upon economic theory (cost and manpower maximization) nor upon time and motion study.

Questions can be raised about the study. The authors fail to define nursing personnel precisely and their assumption "that a trip observed is a trip required" is shaky. There is no evidence presented either that personnel were working efficiently or effectively, or that the quality of care resulting from the travel was poor, adequate, good or high quality. It may be that the measurement of the quality, even by a very rough index, was considered too difficult.

The methodological approach to the study was sound and standard. The statistical treatment was appropriate. Conclusions were drawn from the findings. The interpretation was based upon knowledge in the field.

The study is a highly interesting one. Since it was conducted in a hospital meeting specific criteria for use as a data field, generalizations can be made only about the traffic in similar settings. For these settings, it is interesting to note that an ordering of the traffic frequencies that were observed suggests that medical and surgical patients differ specifically in their requirements for care. For example, the observed means for traffic frequencies were higher for trips involving surgical patients, classified by levels of care, than for medical patients, also classified by levels of care, for all trips between a particular patient's room and the nurses' station as well as trips between that room and all other patient rooms. The same relationship existed for trips involving the clean supply room. These findings give rise to questions about the effect of design, such as placement of substations, monitoring devices, number of patients serviced in a unit, as well as the number of hours in staffing allowed for travel alone.

The study, therefore, hypothesizes that environmental features be considered in planning for different *clinical* types of patients, rather than use of one general design. It points out that different designs and bedroom accommodations do have different traffic costs. These are conclusions that individuals may wish to keep in mind in planning for new units.

This study is not only helpful in evaluating the relative efficiency of the unit design but may also be applicable in evaluating the effectiveness of a certain staffing mix.

A18. Gaus, Clifton R. "A Study of Nursing Time Allocation." Unpublished Master's Thesis, Graduate Program in Hospital Administration, University of Michigan, Ann Arbor, Michigan, 1968.

Review

Purpose.—The basic purpose of this study is "to describe how much and what kinds of nursing care is allocated by different categories of nursing personnel to different patient populations." The nursing care was given to 150 patients at a specific hospital located in a medical center.

Methodology.—Five hypotheses were tested. Four predicted that patients 65 years of age or over would receive, on a per patient hour basis, a greater amount of nursing care than patients under 65 years of age considered on four differing dimensions. The nursing care was that "automatically assigned" and "judgmentally assigned" used in administration of medications, provision of treatments, obtaining vital signs, and total nursing care. The fifth hypothesis predicted that the 65 years and over patient would receive a total of more care from *each* category of nursing personnel.

Data were collected by work sampling techniques, as described in USPHS Publication No. 370. (C38) Five observers were trained and randomly rotated through the four experimental nursing units: two medical and two surgical units. All patients were assigned to their rooms randomly in regard to age.

The nursing activities were categorized into 16 categories. These were then grouped into three major subdivisions: direct care, indirect care, and personal care.

The tools were so designed that the observer noted who performed the activity and also assigned the indirect care activities to a single patient or group of patients. Activities were considered "automatically assigned" if they were performed in the presence of a patient; "judgmentally assigned," if the nursing personnel reported that the activity was for a single patient or "all group" (if for more than one patient).

Direct care activities automatically assigned to the patient in whose presence it was performed were as follows: medications, treatments, vital signs, personal care, supportive care, feeding, and transport patient. For activities entitled "rounds" and "charting," the observer judgmentally assigned the activity to a patient after asking the nursing staff member to identify the patient for whom she was performing the activity. Activities such as clerical, reports and conferences, exchange of information, unit servicing, personal, and other general activities were directed toward more than one patient and assigned to an "all patient" group of observations.

Data collection was for a 20 hour period for 7 days.

Findings.—Of the 105 patients, 26 percent were 65 years of age or over. Seventy-four percent were under 65 years of age. The average length of stay for the older group was 16.7 days; for the younger, 14.7 days.

The work sampling observations total 6,194. Of these, 2,530 were "automatically assigned" and 1,434 "judgmentally assigned." The author was concerned about possible bias of observers since they did not rotate all shifts. However, he concluded that this would not affect the reliability of the "automatically assigned" activities. The observations were assigned as "automatically assigned" or "judgmentally assigned." The null hypotheses were tested for differences in proportion of the various activities using normal distribution. One tailed t tests were applied.

Conclusions.—Five conclusions were drawn.

Patients 65 years of age and over, on the average, receive a greater amount of direct care than do those under 65 years of age. The "judgmentally assigned" care does not differ for the two groups; therefore, the *total care* received by the older group is larger. The older population of patients receive significantly more nursing care in the categories of "treatments," "vital signs," and "rendering personal care." The under 65 years of age group received more care in the category of "medication preparation and administration." All four groups of nursing personnel gave a significantly higher amount of "automatically assigned" nursing care to the older age group.

Critique

The question of the influence of the variable, age of the patient, upon the amount of care required is a highly significant one. Although the advent of Medicare has highlighted the problem, the problems exist for staffing regardless of how financing is handled.

The author refers to the findings of the studies by CASH and by Jacobs (AHA Nursing Activity Study) and draws upon the methodology of the later study. No other theoretical framework is provided, however. The physiological and psychological research that deal with changes in the human organism such as learning ability, adaptation, or the process of aging is not drawn upon as a basis for study. Neither does the author go into any discussion of interaction theory involving amount of time in one-to-one relationships or the problem of perception when sensory deprivation may be present in one role occupant.

The study is well designed and carefully conducted. The conclusions emerge from the data. This study does present a further refinement of a methodology that may be useful in studying nursing care activity. The concept of identifying activity by patient assigned and by the total group could enhance the methodology of work sampling.

A19. Goertzen, Irma Edith. "A Study to Determine the Quality of Nursing Care Given to Medical Patients Before and After the Roles of the Professional and the Technical Nurses Were Differentiated." Unpublished Master's Thesis, University of Washington, Seattle, Washington, 1968.

Review

Purpose.—To determine whether any change occurred in the quality of nursing care given after the role of the team leader was redefined and assigned to the professional nurse. This study was involved with the period prior to the initiation of role differentiation (Phase I) and 3 months after implementation of the role change (Phase II).

Sample.—Data were collected on patients in a 28-bed medical unit of a 240-bed University Hospital. Information was collected two times per week during the 7 weeks between November 2 to December 16 and during Phase II, which covered the time between April 7 and May 18. All 7 days of a week were utilized for observation. Nursing care was assessed on 284 patients during Phase I and on 250 patients during Phase II.

Instrument.—Nursing care was evaluated by the Pardee "Standards for Nursing Care" tool. "The tool, which was subjective in nature, was developed for use in the University Hospital by a committee of head nurses, supervisors, and research coordinator, and one faculty member from the School of Nursing. The 17 phenomena measured by this tool as criteria for quality of nursing care were based on Abdellah's 21 nursing problems which were defined in *Patient-Centered Approaches to Nursing*." (A3) The 17 phenomena included therapeutic environment, respiration, skin care, oral hygiene, elimination, nutrition, body alignment, sleep and rest, safety, medications, therapeutic treatment and procedures, diagnostic treatment and procedures, understanding of restorative care, learning experiences, activities understanding, motivation, and teaching regarding preventative aspects of nursing care.

Methods utilized in collecting data included patient interviews, investigator observation, and evaluation of the patient's chart for medication and treatment information.

Procedure.—The data collected during Phase I were used as a baseline for later data. During this time there were two team leaders each day, one technical nurse and one professional nurse (defined on the basis of basic nursing education). No differentiation was made in the assignments of the professional and technical nurses as either could be assigned the role of team leader or team member. Technical nurses were usually assigned to the intensive care unit.

During Phase II there was only one team leader for the entire unit. The role was to be fulfilled only by professional nurses. Other registered nurses were assigned as team members. Technical nurses were always to be assigned to the nursing care of patients in the intensive care unit. Professional nurses with inservice training in coronary care were assigned to the two bed coronary care unit.

The budgeted staff positions during Phase I included: head nurse; one assistant head nurse per shift; two team leaders for days, two team leaders for evenings and one for nights; one staff nurse per shift for the intensive care unit; one staff nurse or team member during the day shift; one LPN or team member during days; one LPN for medications per shift; and one unit clerk each shift (½ time at night).

During Phase II, three staff nurse positions, one per shift, were added because of the addition of the two bed coronary care unit. Before Phase II, weekly conferences were given on the role expectations of the team leader for ward personnel.

Patients were interviewed between 11 a.m. and 1 p.m. The interview was structured around direct questions. The response of the patient determined the necessity for pursuing the subject to determine what measures were taken by the nurse. Phenomena such as body alignment and safety were evaluated by the investigator's perception at that moment. A qualitative scale was used in which patients were placed in a category of satisfactory, unsatisfactory, not observed, or not appropriate.

The investigator and the nurse responsible for a reliability check were instructed in the use of tools during two training sessions by Pardee and two practice observations on another ward at the same hospital. The reliability on 10 percent of patient observations showed a 96 percent reliability in patient data and 92 percent in Phase II data.

"A qualitative scale was used in which the patients were observed and placed into a category of +(satisfactory), −(unsatisfactory), O(not observed), or X(not appropriate) depending on the observer's perception of how well the subject met the criteria of the phenomena being measured. The amount of difference necessary to classify a patient in the + or − category was not defined, but was a judgment made by the observer. A nominal scale was used in which each phenomena possessed a distinct attribute in terms of the variable, quality care." These phenomena were not ranked. Each phenomena was tallied, providing quantitative data.

Findings.—The data were analyzed by a description of the patient population, staffing pattern, and comparison of Phase I and Phase II data according to sustaining care, remedial care, restorative care, and preventative care.

The mean age of patients for each group was 51.5 years and 51.8 years with a range of 12 to 18 and 14 to 87.

The usual staffing pattern per 24 hours for Phase I and Phase II was one head nurse, two assistant head nurses or charge nurses, 10 to 11 registered nurses, and three to six practical nurses. Senior students from the University of Washington received team leader experiences on the ward. The 1967 annual report indicated a 75 percent staff nurse turnover for the nursing department.

The total number of patients under the care of the professional nurse team leader in Phase II was 171. The technical nurse was responsible for 113 patients in Phase I.

A comparison between the values assigned to nursing care under the direction of the professional nurse and technical nurse during Phase I did not demonstrate a difference in the quality of care. In the area of safety, 66 percent of the observations for the professional nurse and 58 percent of those for the technical nurse were negative values.

The nursing care under direction of the professional nurse showed some improvement in Phase II from Phase I. Oral hygiene, elimination, body alignment, sleep and rest, and safety showed the greatest improvement.

Analysis of values assigned to care under the technical nurse in Phase I and professional nurse in Phase II showed no notable difference. There was some evidence of improvement in preventative care in Phase II by a decrease in negative values.

There was evidence that a slight improvement in care had occurred during Phase II by an increase in positive responses and decrease in negative responses to overall quality of care.

Critique

The whole question of the difference in the performance between graduates of varying backgrounds is a vital and nagging one. If a difference does exist, this difference sets forth major implications for staffing. The attempt to examine the question by studying the effect of filling team leadership positions by individuals prepared in different educational programs is commendable.

The study draws upon previous work carried on by another worker. Only a limited theoretical framework is provided with limited discussion of role, role functions, role expectations, and role fulfillment.

Measurement of quality of care provided a group of patients is obtained before and after the introduction of the experimental treatment. The treatment consisted of the preparation of the individual assigned to the position of team leader. Whether or not the treatment was great enough to make a change is a valid question. No report was made about the success with which role functioning was achieved. The tool used to measure quality of care was subjective; it was not tested for validity or reliability.

The findings are based upon the data presented. Conclusions and interpretations are cautiously made.

The value in this study, which is weak because of the points mentioned above, is its identification and exploration of the question: what is the difference in the performance of individuals thus prepared?

A20. **Gorham, William A.; Lichtenstein, Stanley; and Marchese, Angeline C. *Specific Nursing Behaviors Related to Patient Care and Improvement: Measuring Nursing Performance.* Final report, (GN 4648) American Institute for Research, 6135 Kansas Avenue, Washington, D.C., May 1959.**

Review

Purpose.—To identify the specific nursing behaviors contributing to patient care and improvement and, on the basis of these, to develop methods for measuring on-the-job performance of general staff nurses.

Method.—The first year of the study was devoted to the identification of the current role of the general staff nurse and to the development and tryout of preliminary measurement techniques based on this role. The specific behaviors of general staff nurses were derived from over 2,000 factual descrpitions of incidents involving effective or ineffective nursing performance in relation to patient care and improvement. These data were based on 686 staff nurses, nursing supervisors, physicians, and patients in 10 general hospitals. Similar behaviors were grouped into five major areas of performance as follows: improving patient's adjustment to hospitalization or illness, promoting patient's comfort and hygiene, contributing to medical treatment of patient, arranging management details, and personal characteristics. The major findings leading to the study were four: • Although behavioral areas and categories were acceptable to nursing personnel in their coverage of the job of patient care, the relative contributions of the performance areas to the total job of patient care were needed to increase the relevance of any measurement procedures. • Ratings of nursing performance reflect the typical leniency and halo effects commonly found in ratings and should be reduced in new measurement procedures. • Description of behavior rather than evaluation of behavior will increase the objectivity of measurement methods. • The reliability of the head nurse as describer and evaluator of behavior should be checked.

To identify specific behavior representative of the behavioral areas found to be critical to patient care and improvement, key behavioral statements in each of 2,000 incidents were extracted. The statements described the critical behavior involved and met the following criteria: concise wording, specificity as to action, applicability to most nurses, clearness of expression, use of original incident language, unity of thought, absence of qualifiers, and avoidance of "facts to . . ." statements. The resultant 320 statements are included in the appendix. Examples are: reassures patient's family, explains why tests were ordered, neglects to explain hospital setup, praises patient's progress, pampers patients, pads pressure areas, etc.

"The "criticalness" of each statement was established by empirically determining the degree to which each statement described effective nursing performance or the degree to which each is a desirable behavior in relation to patient care and the degree to which each statement differentiates between the performance of the best nurses and the poorer nurses. The degree to which each statement describes effective performance is the affect value. Sixty-eight head nurses independently sorted 320 statements into a seven pile forced distribution. The scale ranged from "least descriptive of effective nursing performance" to "most descriptive of effective nursing performance." The affect value for each statement was the average scale position for all of the head nurses. The correlation of the mean scale value of the first 34 head nurses with the last 34 head nurses was .97. The degree to which each statement differentiates between good and poor nurses is the discrimination value. Fifty-five head nurses in eight Washington, D.C., hospitals indicated the degree to which each statement described nurses by sorting each statement into one of five piles. A separate sort was made for the best nurse and poorest nurse. No forced distribution was used. The discrimination for each statement was computed by averaging its scale position for the good nurse group and subtracting the poor nurse average from this score. The correlation of the mean scale values of the high sort for first 27 head nurses with the last 27 head nurses was .98 and .90 for the "low" sort. Examples of statements, their discrimination, and affect values are as follows: prepares patient psychologically for treatment —1.97, discrimination value, and 4.89, affect value; reassures patient's family—1.64, discrimination value, and 4.37, affect value; pampers patients—.02, discrimination value (not significant at .05 level of confidence) and affect value, 3.20.

The contribution of each of the areas and categories of nursing behavior to the total job of patient care was determined. Seventy-six head nurses were asked to apportion 100 points among five areas and to distribute the points among the categories in each area. The five areas and corresponding weights were as follows: improving patient's adjustment to hospitalization or illness, 20.8; promoting patient's comfort and hygiene, 14.1; contributing to medical treatment of patient, 30.8; arranging administrative details, 20.9; personal characteristics, 13.4. The instructions for applying weights to these areas and subcategories are in the appendix.

Instruments.—The Profile Checklist was designed to identify the strengths and weaknesses of a general staff nurse by comparing her performance in each area with her own performance in four other areas. Five statements in each of the 10 groups of statements represent five areas (these are not marked). The head nurse checks two statements that are more like the typical performance of a particular staff nurse and least like her performance. More like items are three points; least like items are of one point value; and two points are given for the unmarked item. The remaining portion of this form consists of 10 pairs of behavioral statements selected for high discrimination value and matched in affect value. Four points are given for effective performance statements and one point for ineffective performance.

The Graphic Rating Form is an instrument designed to obtain evaluations of performance. The behaviors in the instrument were selected on the basis of high affect value, high discrimination values, and observability of the behavior. Ratings are obtained in each of the 50 items by asking the rater to compare each nurse with all the other nurses she has ever seen performing the activity and to indicate the top 20 percent, the next 20 percent, the middle 20 percent, etc, for level of performance. Item scores were based on one to 15 values for each item. The resultant average scores are weighted since the areas and categories are represented in proportion to their weights.

The Forced Profile was devised to obtain an estimate of a nurse's strengths and weaknesses in the five performance areas. The rater distributes 100 points among the five areas according to her judgment of the nurse's strengths and weaknesses. The area of proficiency rather than the level of proficiency is described.

The Preference Checklist was designed to obtain an estimate of a nurse's overall performance in comparison to other nurses. The checklist consists of 50 pairs of behaviorial statements, each pair from the same performance area matched in affect value but different in discrimination value. The observer checks the statement in the pair that best describes the nurse's typical performance. Scores were based on the discriminating items that were checked, therefore providing more objective evidence.

The Observation Record is an instrument designed to provide framework for recording day-to-day observations of effective and ineffective performance of general staff nurses. The observer notes specific incidents in the appropriate area and category on the form.

The Observation Checklist was designed to systematically collect reports of a nurse's performance over an extended period of time. One hundred items were selected on the basis of their judged observability and frequency of occurrence. Two forms were developed: the items that were matched for affect and discrimination values. The observer reads through the items each day and checks those behaviors that she observed. Since some items are not checked, a percent score is computed by dividing the number of checked discriminations by the number of items checked.

During the first year of the study, evaluations of 11 general staff nurses were obtained from 33 patient report forms over a 2-month trial period. The care of each patient was the entire responsibility of one staff nurse. The major findings were as follows: • nurses rated high in all performance areas, • there was little variability among areas, • patient evaluations differed from physician and head nurse evaluations but not consistently in one direction, and • some patients had difficulty in understanding the form. The revised procedure for this study involved a volunteer worker interviewing the patient immediately prior to his discharge. The patient was asked about the nurse's performance on 49 specific behavior and hospital care items. The nurse was identified by name or photograph. Interviews were conducted by research personnel in a small feasibility study. Interviews of nine patients elected only the most superlative evaluations based on a review of the experience of Abdellah and Levine in collecting patient data. The instructions were revised to emphasize the need for determining the nurse's strong and weak points. The wording was modified to make questions less directly accusatory. Patients were interviewed at various stages of their hospitalization at two hospitals. Eighteen patients were interviewed but only five general staff nurses were identified and six ineffective behaviors were reported. Of 59 items, 26 were checked as inapplicable by 50 percent of the respondents. All of the items in areas of helping the patient adjust to hospitalization or illness were considered inapplicable. Two of the 18 patients objected to the idea of evaluating specific nurses. A shorter form was prepared that included items applicable to most patients and items expected of professional nurses. This form was not used in this project.

Sample.—Two Washington, D.C., hospitals of over 400 beds. The assignment pattern, ward staffing, and duties of ward personnel are similar. All of the head nurses who participated in the research project did so voluntarily. In Hospital A, the professional staff nurse is assigned by the head nurse to a group of patients. The staff nurse makes specific assignments to the auxiliary personnel.

Procedure.—Short training programs were given to the head nurses at each hospital. The program covered rating theory, uses of ratings, and errors in rating such as halo leniency. Emphasis was placed on the desirability of obtaining descriptions of the nurse's strong and weak points. Spread of ratings was encouraged and specific instructions were given for completing forms. The head nurses described the performance of each day-tour, full-time staff nurse on the Profile Checklist and on the Graphic Rating Form. Half of the nurses in each hospital used the Observation Record and the other half the Observation Checklist. The head nurses were specifically trained to use these forms. At the end of the 3-week observation period, the head nurse completed the Preference Checklist and the Forced Profile Forms as the same nurses in individual interviews. Each head nurse was interviewed to obtain information in the reliability and validity of the forms. Peer and self-evaluations were obtained from the general staff nurses through the use of the Graphic Rating and Forced Profile forms. Fifty-eight of the 73 staff nurses completed these forms during the 3-week period. A nurse on the research staff observed the performance of staff nurses during this 3-week period for 10 half days. Her notes were later transcribed to Observation Records and Observation Checklists for each of the staff nurses.

Findings.—

- There is general agreement by the nurses participating in the study, by directors of nursing and by cognizant nursing experts, that the behaviors identified for this study are thorough in the coverage of what the general duty nurse does to contribute to patient care. Eighty-eight percent of the 320 statements abstracted from the original data significantly discriminated between effective and ineffective nursing performance.
- To determine the head nurse's stability in evaluating performance, the overall scores from the Graphic Rating Form show significant agreement with the other three forms. Four of the five possible comparisons show significant agreement. The agreements among evaluations on the three scaled instruments were determined by mean rank differences. The correlations are in the expected direction, better at Hospital A, and best in the area of personal characteristics. The agreements of head nurses with staff nurses are in the expected direction as is the head nurses with the researcher. However, there is little agreement between the head nurse and the researcher in the results of the preference checklist.
- The entire range of scores from the Profile Checklist, Graphic Form, Forced Profile, and Observation Checklist were utilized. Factors in addition to those involving personal characteristics do appear to be influencing the Graphic Form ratings.
- Subjectivity has been reduced by requiring judgment only on those behaviors actually observed.
- School grades and the scores on the National State Board Pool Examinations were compared with performance measures. Performance in medical treatment is related to school grades in medical and surgical nursing courses. School grades in nursing arts are related to performance in comfort and hygiene. State Board scores are not related to overall performance.
- Head nurses' reactions to the forms are described.

Conclusions.—The instruments and procedures developed and utilized in this study have been evaluated in terms of how well they meet the criteria of criterion measures.

The forms are suitable for research projects where criteria measures are required.

Measurement of nursing performance in the area of psychological care is more difficult than for any other area.

The low ratings given in the area of arranging management details indicate that the area needs further investigation and definition.

Suggestions for evaluation procedures are presented.

Critique

The evaluation of nurse performance is no small task and an intelligent approach bearing upon observable behavior is greatly needed. Drawing upon their previous work, these investigators set about to test items and tools using standard measurement methodology with this intent in mind.

Unfortunately they provide no theoretical framework for the research. There is no reference to literature in field of measurement, no comments about the attempts made in nursing performance measurement of students, and no reference to the rationale underlying evaluation itself. The value of the study lies in its systematic attack on testing statements of behavior and examining the reliability of various tools using different sources of information about the behavior. The reporting is detailed, sampling adequate, and findings based on data that are reliable and valid.

The periodical release of the study is limited to one article that appeared in *Nursing Research*, No. 11, Spring 1962. The research is related to the question of staffing. To provide amount and kind of staff is only one aspect in the delivery of care. To determine what is produced and how personnel perform is a second. These authors provide useful information for employers of nursing personnel.

A21. Hardner, Sister Margaret Ann. "A Study of Unit Management." Unpublished Master's Thesis, Xavier University, Cincinnati, Ohio, June 1969.

Review

Purpose.—"The general objective of this study was to collect, analyze, and publish data that would prove helpful to hospital administrators and directors of nursing who are currently considering the implementation of the Unit Management Systems. A secondary objective was to demonstrate the development and implementation of the Unit Management Program at St. Vincent Hospital and Medical Center and to evaluate it after one year."

Instruments.—A preliminary questionnaire was sent to 241 voluntary, acute, short-term general hospitals each having a minimum of 400 beds and all located in the United States. Questions concerned the existence of unit management and the desire to implement unit management.

Sample.—A total of 216 questionnaires was returned from the selected sample. Sixty-three letters were sent to administrators who had indicated they had unit management and would cooperate with this study. Forty-three usable returns were the basis for this study.

Procedure.—The approach of this study included the analysis of questionnaires and an explanation of the unit management program in one hospital.

The first questionnaire asked the hospital administrator to check whether or not he had a unit management program and to indicate whether he would complete a more detailed questionnaire regarding unit management programs. If he did not have a program, he was asked to explain the reason for not having it.

A final survey form was sent to 43 hospitals. This form was divided into four sections: Hospital Information, Unit Clerk, Unit Manager, and Department of Nursing. The survey included open-ended questions, requests for very specific information, and "yes" or "no" questions. A copy is included in the appendix. No statements of validity or reliability are included.

The development of unit management at St. Vincent Hospital and Medical Center is presented. The hospital recognized their responsibility for providing comprehensive, quality care for the people of northwest Ohio. A general session was held for nursing supervisors, head nurses, and department heads in which Sister William Mary, a resource person, encouraged the development of a

Unit Management Program. The Unit Management system was initiated and two unit managers were hired the first week. Both men began a 6-week orientation program conducted by the staff development department. Within 13 months all nursing units were being serviced by unit managers, from 8:30 a.m. to 5:00 p.m., Monday through Friday. Major objectives were established. Several workshops were held, job descriptions for all personnel were revised, and classes for registered nurses were conducted by staff development. "It is the belief of administration in the department of nursing that these concentrated activities toward provision of better care through proper utilization of nursing personnel were made possible, if not entirely, at least partially because of unit management." Unit managers coordinated the activities of all ancillary departments. The unit budget was emphasized.

Analysis of data from the 43 questionnaires revealed the following facts. Twenty-two of 43 hospitals ranged in size from 400 to 549 beds. The average annual number of admissions is between 17,000 to 18,999. Fifteen hospitals had a percent of occupancy rate below 85 percent. The number of nursing units ranged from 10 to 39 in the hospitals studied.

The analysis of data included a description of the unit clerk. Thirty of the unit clerks report to the unit manager whereas 12 report to the head nurse. The respondents indicated a preference for maturity. A list of special traits and characteristics is included. Thirty-five hospitals have a planned program of orientation and 16 conduct this program from 6 to 24 weeks. Thirty-seven hospitals indicated a unit clerk on each unit although only eight hospitals have unit clerk coverage on all three shifts. Forty-one of the respondents are satisfied with the performance of the unit clerk.

The unit managers functions are described. Of the 27 hospitals conducting the program with men and women, 22 indicated no differentiation in performance. Nineteen hospitals preferred ward managers to be between 36 and 50 years of age. Seventeen hospitals preferred college graduates, whereas, only five hospitals required previous experience. The salary ranged from $3,600 to $11,000. Twenty-seven hospitals reported a negligible turnover, whereas, 16 hospitals discharged unit managers for unsatisfactory work. Thirty said the position provided satisfactory challenge for college trained persons. Forty-one said recruitment was a problem. Twenty-nine of the hospitals had the unit management program under administration; 13 had the program under the department of nursing. Thirty-one hospitals indicated that the unit managers were satisfied with their position in the organizational structure. Twenty-one hospitals have training programs from 2 to 8 weeks. There were 12 other titles besides unit manager used to indicate a performer of nonnursing duties. Medical-surgical units were the primary areas in which unit management functioned. Thirty-four unit management programs do not provide 24 hour coverage but only 15 do not have weekend coverage. A list of the reported tasks that are expected of the unit manager is given.

Thirty hospitals had more than 1 year's experience with the program. Twenty-five hospitals had reservations regarding cost. Thirty hospitals noted a definite improvement in morale among nurses. Thirty-six hospitals indicated that improvements justified cost. Fourteen hospitals indicated that administration had proposed unit management. Twenty-one were proposed by department of nursing, and seven were a result of a joint proposal. A list of objectives is presented. Twenty-three hospitals felt the unit management program definitely relieved a nurse shortage. Twenty-five hospitals indicated that an evaluation of the service departments was in progress. Nine respondents indicated that the University of Michigan best reflected the unit management concept. Twenty-seven hospitals took at least 6 months to study and plan the management program. Thirty-one hospitals indicated that personality differences or lack of confidence in unit managers were experienced in the first stages of the program.

Data regarding the department of nursing are analyzed. Thirty-eight reported they utilized the team approach to patient care. Thirty-nine hospitals have taken some action to define the role of the nurse. Sixteen hospitals reported that professional competence is a factor in selling registered nurse salary rates.

Critique

The implementation of the unit management system undoubtedly affects the method of staffing. This author has shed light on the diversity of existing unit management programs.

The theoretical framework of this study is sketchy. The managerial function of the nurse is mentioned as is the need to get the nurse back to the bedside. The purpose of unit management is only briefly reviewed.

The use of a questionnaire to obtain information about existing management programs is appropriate but the purpose of the questionnaire, its validity and reliability, must be carefully conceived and assured. These have not been accomplished in this study. The sample was carefully identified and was adequate. The analysis of data was based on the results of the questionnaire but the conclusions and recommendations are loose and not supported by the data.

The questionnaire included questions as to the numbers and levels of various staff positions but this information was not included in the analysis. The author did not attempt to relate unit management with staffing levels or patient care needs.

This study as designed and carried out is not relevant to nurse staffing methodology. This is unfortunate since the institution of this type of program must make some impact on patient care and staffing levels.

A22. Her Majesty's Service Statistics and Research Division Ministry of Health. "Hospital Service Inquiry into the Development of Nursing and Midwifery Staff." Unpublished report, (no date).

Review

This is a demographic study detailing the deployment of nursing staff in 92 Regional Hospitals, 16 teaching hospitals in England and Wales, eight hospitals in Scotland and five in Northern Ireland. These were hospitals of 200 beds or more, were acute in character, and at least 40 percent of the patients were surgical patients.

Purpose.—The study had two main objectives: "• to ascertain whether any ward or hospital features appeared to affect the level of nurse staffing in those hospitals which participated in the study, and • to compare the ward staffing in those hospitals that participated in the study."

Method.—Survey method was used. Data on nurse staffing were collected in the period of October 1963 to December 1964. Each hospital supplied information about the number of and deployment of nursing staff and about factors that might be related to staffing. The survey was for 7 separate weeks, the first three at monthly intervals and the last four at weekly intervals.

The data were summarized in tabular form and were reduced in some instances to percentages for treatment. Graphs, charts, and figures assisted in picturing the data.

The criterion of the level of nurse staffing used in the analysis was the nursing time per patient per 24 hours. It excluded the night supervisory staff and a day sister filling the role of head nurse. The nursing time per patient per 24 hours was calculated by dividing total weekly hours by number of patient days.

Findings.—Findings are presented in various groupings: • type of wards; • selected physical features of wards; • occupancy rates of wards; • average nursing time in different specialties; • inter-ward variations in average nursing time by specialties; • relationship between average nursing time and selected ward features, such as patients and beds, occupancy rate, turnover, adult wards, and physical division of wards by corridors and curtains, day patients, centralized services; • comparisons within hospitals; • differences in staffing; • interhospital comparisons; • differences in region.

The findings are summarized into 13 main findings. Several were directed toward the variation between wards, hospitals, and regions. The principal ones relating to deployment of staff are these:

- Type of specialty was a main feature taken into account in planning staffing as was the number of beds in a ward;
- There was no evidence that physical layout was taken into account;
- There was no evidence that the proportion of total staff provided by students or staff nurses nor nonnursing support was related to allocation between wards;
- When controls were built in, holding certain factors constant, a high proportion of wards had much the same level of staffing.

Critique

This report of an inquiry into staffing practices in England, Scotland, Wales, and North Ireland serves as the basic document for staffing formulae presently being used by HMS Ministry of Health for staffing new hospitals. The study draws heavily upon hospital data and information about present staffing practice. The selection of hospitals was made to obtain a picture of different kinds of situations (teaching versus regional hospitals) and to represent hospitals in different geographic settings. The time of the sampling spanned a period of over one year, but data were collected at monthly intervals and then at weekly intervals in an attempt to cope with seasonal, weekly, and daily variations that might have been operating.

The data were summarized in simple form. No sophisticated treatment is applied, although the findings are presented in various groupings and could have lent themselves to more detailed analysis. The general summary of the findings is well put together.

This report is highly significant for the countries involved. The number of variables about which information has been obtained is impressive. A large volume of baseline data has been collected and can be used in subsequent studies.

A23. Holmlund, B.A. "Nursing Study–Phase I, September 1967." (NHW 607–7–100). Hospitals Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

Review

Purpose.—To measure the amount of service provided patients, to establish whether or not the classification system reflects the amount of care provided and who provides the service.

Instrument.—A method for categorization of patients was developed. A number of categories schemes were reviewed including those developed by Connor at the Johns Hopkins Hospital and MacDonell of the Deer Lodge Hospital in Manitoba. The nursing staff identified nearly 100 variables to be the criteria. These variables were sorted into broad areas as follows: general vital statistics, room facilities, physical attachments, monitoring and observation, ambulation, personal care, and nutrition. The form used for a series of hospital surveys consisted of 36 items. Those variables considered superfluous or relating to special cases were eliminated.

A registered nurse and a doctor conferred with the head nurse to assess each patient using the classification system and placed these patients into one of six categories. These categories are: self-care, minimal care, standard care, acute care, intensive care, and terminal care. These are described and examples of patients are given for the categories. The care level discussed is primarily physical.

Later this head nurse's evaluation was compared with the classification form filled out by the project nurse. The objective form was found too cumbersome so a simple three-level form was patterned after the system in use at the University of Washington. The two systems of classification were then compared. The total number of patients in each class compared within 3 percent; disagreement on individual patients was less than 10 percent. A system was devised and ordered in the scoring of the classification form.

Six total hospital surveys were undertaken to determine the population in each of the six earlier categories. The number of patients in the hospital for investigation only, the number of patients able to self-administer some or all their medications, and length of stay were noted in these surveys.

Results of these surveys show that 30 percent of the patients are in the self-care category. Forty percent in this category are scheduled for surgery or expect to be discharged within 2 days. An additional 25 to 35 percent require only minimal medical and nursing care. Approximately 60 percent of the patients on medications are, in the opinion of the head nurse, mentally and physically capable of administering their own medications. These data suggest the creation of a self-care or minimal-care unit.

The characteristics that define these five levels of care have been checked against the qualitative assessment of experienced nursing staff. (The report does not specifically state which category was eliminated. In reading the report, it is assumed to be category 6, terminal.) Two wards were then studied to establish whether or not these categories reflect the amount of service provided and to determine who provides this service for each level of care.

A general surgical ward and general medical ward were studied for 13 and 12 days. The total population was 946 patient days. Two hundred twenty-six patient days were sampled. Although an attempt was made to obtain 30 patient days in each of the five levels of care, the number of patients in each category for surgery were as follows: 31, 27, 29, 26, and 6. The number of patients in each category from the medicine unit were 38, 26, 13, 27, and 3. The size of the nursing staff according to seven categories of personnel is presented in a table. A total of 392 staff days correlates with the sampling period. The surgical ward included a nine-bed intensive care unit. It was not possible to station sufficient observers to get the total number of entries to the intensive care unit. The medical ward contained a high number of terminal-care patients that were classified as category 4 according to the head nurses' evaluation.

Procedure.—Observers were placed in the patient's room from 8 a.m. to 4 p.m. on weekdays only. They noted which person entered the room, time of entry, duration of each activity, type of activity, and description of the activity. A 17 category checklist was used to determine which person entered the room. The time of entry was recorded to the nearest second and duration of activity to the nearest 10 seconds. The observer was to note whether the activity was associated with the room or with a patient. A narrative description of the activity was recorded. When there was no one in the room, the observer coded the activity into one of 19 functions. An example of the description of one function follows: "Patient education—advising the patient regarding illness, treatment, diet, restoration of health, etc. Teaching patient physical activities, personal hygiene, rehabilitations, etc."

Data were reviewed by the head nurse and the activity coded as "Below," "At," or "Above" the level of training. Because the observers were assigned to a particular room the night before and the level of care required by each patient was assessed by the head nurse and project nurse on the following day, changes in category, transfer, a minimum of total care patients, and a balanced sample in each level of care was not obtained.

Analysis.—Analysis of data relating to number of visits to patient rooms is presented in table form. The total number of recorded activities was 14,095. There were 12,750 separate entries. There was an average of 73 entries per room or 56.5 per patient from 8 a.m. to 4 p.m. One table shows the entries for patient oriented functions by patient category and by training levels. The distribution of entries by whom and level of function performed is given, as is the breakdown by function of entries where staff were working below level of training. Distribution of entries by primary function and training level is given in another table.

An attempt was made to characterize patients in terms of time spent in the room by each class of staff, time required to perform different functions, and how the work is distributed among various classes of workers. The breakdown of time spent in the patient's room by category of care is presented tabularly. The average time required to service the needs of patients in their room by care category is illustrated by minutes/patient/day shift. The average time spent per patient by each class of staff for each category of patient is shown for medical patients and surgical patients. Another table shows the time spent by staff with patients expressed as a ratio of the time spent with category 1 patients.

To illustrate the differences in functional needs by each category of patient, functions were divided into four groups. High degree of training functions are patient education, assisting physician and house staff, medications, special nursing procedures, and medical staff attention. Functions requiring a moderate degree of training are routine diagnostic and therapeutic procedure, recording and charting, observation, checking, inquiry regarding status of patient, feeding patient, and lab services. Group C is comprised of functions where minimal training is required, such as moving the patient, care of patient unit, room housekeeping, and dietary service. Miscellaneous functions are activities associated with education of students or staff, general conversation, looking for people, and other functions. The time spent in each group of functions for each patient category is illustrated. The differences in functional needs of patients in various categories is illustrated by ratios and figures.

Thirteen tables in the appendix show the percent involvement by each class of staff performing a particular function. For each class of staff showing a greater than 10 percent involvement in performing a particular function, a further breakdown shows the average amount of time spent for each category of patients. Each function is described in terms of which category of staff spends the most time performing the function on the medical and surgical unit. The time spent is related to the category of patient.

To show the distribution by function of each class of worker, six figures are displayed. A table shows the average time per patient that is spent by each class of worker for each category of care. The assistant head nurse and head nurse have similar function profiles: observing the patient without taking direct measurements and assisting the medical staff. The function profiles of the RN, SN, NA, and the OR are very similar except that the RN and SN spend more time in patient education, assisting physician, and medication. The ward aide is primarily involved in moving the patient, care of the patient unit, room housekeeping, and dietary services on surgical, but spends 35 percent of her time with routine diagnostic and therapeutic procedures on Medical. In terms of time involved for various function, there are three classes of personnel: • assistant head nurse and head nurse, • registered nurse, student nurse, nurse aide, and orderly, and • ward aide. However, these classes of workers are further discussed by the care category of patients they serve.

Recommendation.—This study illustrates the wide variation in the average in-room time that staff spends in serving the needs of patients in the different care categories. An illustration of census for 4 days shows a difference on one patient. However, the average time for each category of patient ranged from 148 to 102 units, computed on the basis of total in-room time required by patients based on the average time-day shift for that category of patients. The number of staff ranged from 13 to 17. The same degree of fluctuation is shown on the medical ward. The census variable was three. There were 14 staff during the low of 71 units and 15 staff when the high of 119 units occurred. The removal of a patient in high care category is equivalent to the removal of a number of patients in the self-care category. The loads that the ward staff must adjust to vary in magnitude and in character.

Several approaches to these problems are suggested. The Unit Assignment System is described in detail. The standard time to perform each group of functions per an average patient in each category is used to determine the number and level of personnel necessary to serve an optimal number of patients. Various changes in the unit structure (use of portable desks, carts, etc.) are suggested. The arrangement of types of units and wards is considered and suggestions are made regarding the number of patient units for which an evening and night nurse can be responsible.

The problem of moving patients to areas to match their care needs is discussed. Data collected during the 14 day study on the medical ward are used. The number of moves and mismatched days was determined for five different patient moving policies, assuming self-care, average care, and above average care units.

The necessity of a patient disposition control system is explained. Based on a study of doctor's orders, the percentage of tests administered within the first 24 hours of admission suggests a new approach to the handling of patients at the point of entry into the institution. The recommended system consists of a Patient Distribution Control Center, a Multiple Test Administration Center, and appropriate designed patient care unit.

Suggestions.—

- A number of trips to rooms were made to look for items such as talcum powder, back lotion, etc. These supplies should be stocked in nurse supply cabinet in the patient's room.
- The patient's name should be placed on the door and at the bedside. Entries to look for another patient are particularly annoying to the patient. There is a tendency to refer to the patients as "that one in bed one" rather than by name.
- Many of the procedures that must be learned by new staff could be done more effectively by programed learning systems incorporating audio-visual arts.
- An attempt should be made to schedule at least one or more quiet periods wherein the patient is not disturbed, such as between 1 p.m. and 2 p.m.
- Passageways between rooms should not be used as second corridors.
- All housekeeping duties should be done at one time.
- Noise level due to metal containers, carts, stretchers, and draw-curtains is too high.

- Doors on all rooms have large protruding hooks rather than knobs, which happen to be a hazard without any proven advantage.
- Operating room doors should be self-opening.

Critique

This study is built upon the research that has been done by Connor, Wooden, MacDonell, and others and is a direct application of facets of these works in one medical care setting. It has relevance to the methodology of nurse staffing because it is concerned with the basic problem: prediction and control of workload.

In some respects the report itself is difficult to read. Changes in numbers of levels of patients, for example, from one phase of the study to another are not clearly identified. (Some terms are not well defined.) There is no theoretical framework other than a brief resume of the studies mentioned. The three-patient classification scheme was tested but discarded for a five level scheme, which was not tested. The rationale underlying this decision was not given. A description of the preparation of personnel as observers, the preparation of forms for recording data, the field testing of these forms, and other details of procedure is missing. The sampling appears adequate. Only simple statistical testing is used: comparison of numbers of cases, amounts and percentage of time, or total numbers. There is no evidence that the data are valid or reliable.

Because of these limitations, it is impossible to state the contribution of this study to the knowledge about staffing methodology. Time and great effort were spent in looking at categorization of patients, the functional needs by each category, and the level of personnel performing the function. If the data are valid and reliable, the results are sobering. First, the function profiles reveal little differentiation between RN, SN, NA, and OR. What does this imply about use of talent and costs? Second, the variation in functional needs for each category of patient varies widely, indicating great fluctuation in both character and magnitude of what must be achieved by the nursing staff. These are matters of great concern to individuals examining the problems of staffing. However, the confidence one can place in the results of the study is limited because either the necessary information about the research itself is not given or certain features of the research were overlooked.

A24. Hoover, Joyce Janelle. "A Survey of Professional Nurses in Six General Hospitals to Determine Factors which had Influenced Them to Remain Employed for Three or More Years." Unpublished Master's Thesis, University of Washington, Seattle, Washington, 1965.

Review

Purpose.—To identify selected characteristics of the nurses who had remained full-time employees with the same hospital for 3 years or longer.

To attempt to determine the factors that had influenced those nurses to remain employed with the hospital.

Sample.—One hundred seventy-one respondents representing 60 percent of the total population of 285 full-time employees who remained at one of the six general hospitals 3 years or longer.

Instrument.—Using research and related literature as a guide, 50 fixed-alternate response statements were developed that included possible factors that could influence length of emloyment. The responses were grouped according to four independent factors identified by Kahn (Robert L. Kahn "An Analysis of Supervisory Practices and Components of Morale," *Group Leadership and Men,* edited by Harold Guitzkow, New York: Russell and Russell, Inc., 1963). The 50 preliminary statements were subjected to a critical appraisal by five graduate students who had several years' experience as hospital nurses. Thirty-eight statements were included in the final questionnaire.

The final questionnaire consisted of: (a) identifying information, (b) job factors to be ranked in order of importance, (c) job satisfaction response statements, and (d) provisions for additional reasons the respondent could list.

Procedure.—The questionnaires were precoded for computation on the IBM 709 computer. Eleven independent variables were matched with 48 dependent variables. "Gamma XMG-2 Program was chosen to measure the degree of association between these variables."

Each of the personal attributes (independent variable) was paired with job factor (dependent variable) and programed for gamma values. Unless the response number in a cell totaled more than five, the −100 or +1.00 gamma values were not considered significant. A gamma value of ±.40 above was considered significantly significant.

Findings.—The personal attributes were identified as the independent variable. The job titles of the 171 respondents consisted of 11 assistant directors, 15 supervisors, 53 head nurses, 14 charge nurses, 14 team leaders, 63 staff nurses, and one manager. The years of registration of these nurses ranged from 1916 to 1961. Eighteen percent became registered nurses in the years 1943 to 1947, and the second greatest number (26) were registered between 1953 and 1957. Eighty-one of the respondents were married and 39 percent were single. The majority of nurses did not have children. The range of full-time employment was 3 to 36 years. Sixteen was the mean years of full-time employment. Ninety-one respondents have been employed at three different hospitals. One hundred and twenty-six were graduates of diploma schools of nursing.

The job factors were identified as the dependent variables. The respondents indicated "interesting work" as the most important factor in choosing to remain at the hospital and "opportunity for advancement" was ranked as least important. Sixty-seven of the subjects did not respond to the list of job factors. The overall ranking of job factors listed in descending order of importance are: interesting work, congenial co-workers, opportunity for responsibility, pleasant working conditions, security, educational advantages, high salary, opportunity for advancement, and other.

Reasons for choosing to remain with the present hospital were inferred from response statements. Statements representing at least 75 percent of the subjects included: "I really like my job," "I am working in the clinical area I prefer," "I understand my job is important, "I know what is expected of me," "I feel my contribution is essential," "I like my hours," "I am given a chance to prove my ability," "I am recognized as a valuable employee," and "This position gives me a sense of accomplishment."

"Statistical associations between personal attributes of the subjects and responses to the job factor items did not indicate major differences within the subgroups of the attributes."

"The findings of this study indicated that of the four major job factor categories, satisfaction with the intensive aspects of the work was the most influencing factor for these respondents in electing to remain employed with the hospital."

Critique

The question of the effect of nurse-staffing prediction and provision of staff upon tenure is a very fitting question. This master's thesis examines the relationship between personal characteristics of the nurse and job factors that may be influencing her retention in a position for longer than 3 years. However, since this thesis does not concern itself with either measurement of patient care requirements or nursing activity, the thesis is only indirectly related to the question of nurse-staffing methodology.

The dependent variables of job factors and job satisfaction were measured by responses to items in a questionnaire. The instrument, although submitted to a jury of five graduate nurses to determine face validity and clarity, was not submitted to any rigorous testing. The sample size was adequate. The statistical treatment was elementary. The findings, though questionable because of their reliability and validity, were interpreted within a limited theoretical framework drawn from writings dealing with supervisory practices and components of morale.

Not one of the findings of importance dealt with staffing or work pressure. This raises the question of whether or not these variables were adequately operationally defined to be measured in the research presented. Or is it true that other factors of the job do rank higher in value to the nurse? This is a pertinent question in planning the effect of staff size and composition.

A25. Howland, Daniel. *The Development of a Methodology for the Evaluation of Patient Care.* (GN 7797) Ohio State Engineering Experiment Station, Columbus, Ohio 1961.

Review

The development of a methodology for the evaluation of patient care, GN-4784, is described in four volumes. A progress report and two appendix volumes cover a 3-year time span concerning the early stages of defining and developing a methodology. The fourth volume includes enough of the earlier reports to be considered independently meaningful. Seven chapters are devoted to theoretical aspects of the problem and ongoing empirical work. The problems and accomplishments of the multidisciplinary approach are presented in four working papers.

The development of a methodology for the evaluation of patient care is a project concerned with the construction of a procedure whereby a hospital can measure the level of care it is providing and determine what action should be taken to improve its level of care. The procedure is being developed in terms of a "model" of the hospital system in which the tasks performed and the utilization of resources included physical plant staff and patients. The specific research areas are five: • consequences of status relations among attending staff in services to patients, • the effects of various policies regarding utilization of plant and facilities on patient care, • the relationship of formal and informal staff organization to communication, • the demands on the hospital imposed by community requirements, and • a study of the role of the patient relative to the hospital environment. Anthropology, engineering, mathematics, medicine, nursing, philosophy, psychology, and sociology are the disciplines utilized in conducting this study. The aim of the research is to develop a systematic view of understanding of the hospital dimensions and their interrelations in order to assist those who must allocate resources and make decisions concerning policies and procedures.

The efforts of the members of the Ohio State University Operations Group who are working on GN-4784 are summarized in the fourth volume. The research is directed toward the evaluation of patient care from a broad, multidisciplinary approach, using techniques and concepts from the physical and behavioral sciences. The aim of the research is to develop a systematic view or understanding of the hospital dimensions and their interrelations in order to assist those who must allocate resources and make decisions concerning policies and procedures. The summary is presented in two parts: the first three chapters are devoted to the organizational-theoretical aspects of the problem and four chapters describe the ongoing empirical work.

The concept of systems research and the desirability of viewing the hospital as a system are described by the principle investigator, Howland. The end product of this study is envisioned to be a sub-optimizing model consisting of statements about the effect of various policies of resources utilization on hospital task performance. The principal variables will be operationally defined in terms of measurable dimensions over which the hospital system has control. The consequences of manipulating these variables will be specified. The primary tasks of the hospital can be defined in terms of procedure for measuring levels of task performance. At the present state of development, no formal relationships can be described. The research team is engaged in efforts to use formal and empirical methods to measure the variables and the effect of manipulation.

An informal statement of the conceptual framework used to solve the criterion problem is presented. William Moeller discusses the way real-world organizations may be viewed in terms of systems concepts and organization structure. The organization or structure specifies its own criterion variable for the performance of the functional system it comprises. The communication links between any functional system and its customers can be examined and the criteria it specifies used as an approximation of the criterion set that should be emloyed to direct the system toward the equilibrium state. A product process analysis of the organization will emphasize those variables over which the administrator has some control. The criterion function is arrived at by examining the intersection of the administrative system with each functional system and weighing that portion of the administrative system according to its needs. Sub-optimization with respect to functional system goals will result in optimization with respect to organizational goals.

In line with the overall purpose of constructing a logical model of the hospital based on all the studies in the project, Martin and McClure briefly describe their accomplishments. The logical model was modified to bring it in line with the present view of the project sociologists. The model was formalized and 54 theorems were deduced.

To determine what effect certain aspects of the social organization have upon medical performance and patient care, John Evans and M. Seeman have developed scales to measure the independent variable of status commitment and station stratification. The relationship of stratification to medical performance is described by the interns' self-report, superior's evaluation of the interns, and objective medical records for consults, autopsies, medication errors, length of stay, bed allocations, teaching value ratings, and personal turnover. To test the assertion that stratification makes a difference in hospital performance, an instrument was developed for measuring the stratification of nursing stations. The scale, ranging from 0 to 100, consists of 10 items descriptive of status behavior on nursing wards. The purpose of the instrument was to obtain from the nurses a quantifiable description of the status behavior of the chief resident.

The author explains that the internal, split-half, and test-retest reliability was acceptable and the results show a high order of agreement as to what is status behavior. The status descriptions were independent of nurse job satisfaction and personal commitment to value of stratified hospital organization. The measure of interns' performance to determine relationship between stratification of the nurses' station and medical performance was based on a self-report by the 42 interns at the end of each month's assignment for 4 months on 14 nursing stations. The instrument consisted of 35 items concerning interns' medical performance. Twenty-seven additional items were descriptive of the station's performance. Tentative findings concerning the relationships of stratification to medical performance and charges in the interns' commitment to status is presented.

Three related studies were undertaken to describe the role of the patient. The objective was to determine the way in which the patient contributes (a) to his own treatment and (b) to the performance of the hospital functions such as selection, service, supply, and control. A general survey of literature revealed a deficit in scientific information of a psychological nature concerning general hospital patients. Sociology and philosophy groups are beginning to understand the interpersonal dynamics of the hospital. Two months were spent in free observation, confirming much of what has been published about general hospitals. To determine the role of the patient and his contribution to his own care, R. S. Thrush discusses a study of information level of diabetic patients after hospitalization. Another study attempts to measure the readability of selected printed literature that is given to diabetic patients. The third study relating personality variables and variation in the control of diabetes is in the planning stage.

Algebraic models, both linear and nonlinear, and a series of programing models are two approaches to the problem of planning a system of hospitals for a community. The direct analytic approach offers insights into questions of location, size, and area. The series of programing models permits the inclusion of a greater variety of factors that are important in the planning problem.

A study of the blood supply system was undertaken to investigate the hospital structure by "sampling" the within-the-hospital blood supply system, to develop a model of this blood supply system and to develop a methodology for investigating any or all hospital supply systems. Current research is directed by W. T. Morris in finding a suitable criteria for the blood laboratory operation.

The problems of interdisciplinary research are discussed in detail. John W. Evans presents the differences in the definition of research between sociologists and industrial engineers. He suggests that the final product is a set of studies on the hospital rather than a model. "Optimal Allocation of Markets to Resources" by M. C. Shetty is a study that deals with the application of the problem of optimal allocation of patients to hospitals. The assumptions, notations, condition for optimal allocation, interpretation of equations, discussion on the nature of market boundaries, solution of the problems, and examples are given. W. T. Morris discusses a method for planning hospital systems. Construction costs, care costs, and travel costs are considered. Seeman, Evans, and Rogers, "Measurement of Stratification in a Hospital System," is referred to in the main body of this report. However, this working paper deals with the instrument in more detail. The procedure of using members of the organization as observers is described as is the reliability and validity of the instrument, the degree of interobserver agreement and the extent that stratification is independent of personal attitudes of the describer. "A Logical Model of the Hosital" is a summary report written by George McClure and Miles Martin. The service performed by these philosophers and/or logicians is checking for consistency among various studies, economy of effort, and translation of various studies into a common language.

Critique

The significance of this research effort lies not so much in the results per se but rather in the approach or method used to study a vastly complex system. The author painstakingly analyzes the many variables in his attempt to erect a model to test these relationships. The combined efforts of many disciplines are admirable and yet the author points out the inherent difficulties in melding two or more separate approaches.

If nurse staffing methodologies could ground their approach in this type of conceptual framework, the directions for study and results would throw additional light on the staffing question.

The majority of the authors are honest and accurate in their reporting. Reliability and validity tests are applied wherever a specific research approach has been tested. No attempt is made to fit the results into a previous assumption.

A26. Hudson, Wellborn Royston. "An Application of Management Engineering to Nonrepetitive Work–Hospital Nursing." Unpublished Doctoral Dissertation, Department of Industrial and Management Engineering, University of Iowa, Iowa City, Iowa, August 1954.

Review

Purpose.—To determine "to what extent can the viewpoint and techniques of industrial engineering approach in nonrepetitive work the great contributions which these have made to repetitive work."

Premises.—Chapter I is devoted to presenting the distinguishing characteristics of repetitive and nonrepetitive work. Hudson outlines the seven major considerations and elaborates on each characteristic to indicate the differences in repetitive and nonrepetitive work. Applying each characteristic to the work of the nurse, he attempts to justify his conclusion that the nurse's work is nonrepetitive because:

- Relationships of the individual worker's contribution to overall task attainment: hospital nursing care is a team task, uncharacteristic of repetitive tasks performed by one individual.
- Restrictions of variety of tasks: the nurse is not restricted to one task as would be the case if her work was repetitive.
- Statement of required work content of the task: there is no complete single statement of the work content of many nursing tasks as there would be in a repetitive task.
- Relative location and movement of workers: the work and the facilities for performing the work. The nurse does not perform her duties in any one place as would be the situation in repetitive tasks.
- Variation of the operation cycle: many work cycles for nursing tasks are short, this being typical of repetitive tasks.
- Desirable attributes of the worker: in general, the judgment of the nurse is required in her tasks unlike those of repetitive tasks.
- Suitable method of wage payment: the law for nurses' wages is hours worked, which is fully characteristic of nonrepetitive work.

Chapter II develops basic concepts with which analysis of the nonrepetitive work situation is to be approached. Based on the work of F. W. Taylor, Hudson outlines and defines the principle analysis for nonrepetitive work. General steps are:

1. Necessary operation of investigation;
    (a) recording current status,
    (b) definition of terms,
    (c) operation of analysis,
    (d) operation of synthesis,
    (e) the testing operation,
    (f) refinement and retest, and
    (g) operation of development of basis for control.
2. Find areas of greatest potential for savings;
3. Profitability of extending study coverage of gross levels of greatest potential savings rather than to dwell on refinements;
4. Use of time values necessary for studies and bases for control; and
5. Adequate attention paid to securing the cooperation and, if possible, participation of the group being studied.

Methodology.—Chapter III states specific techniques applied, cites the applications as to where they are applied and the reason for the application of these techniques. The following techniques and devices are applied:

1. Work sampling (ratio-delay study).
2. Process analysis (process charting),
3. Process analysis (flow diagraming),
4. Written standard procedure (in modified form),
5. Terms study (direct observation, considerably modified),
6. Memomotion study,
7. Layout studies,
8. Job manual (general section only),
9. Correlation analysis for staffing criteria study, and
10. Activity study.
    (1) The work sampling study method was found successful for determining the manner in which the nursing unit staff time was being used on the medical and surgical services (appendix A).
    (2) The plans of the medication procedure appeared to be absorbing an excessive amount of time; it was selected by the nurse supervisor for study on the surgical units. Operations of investigation of recording of current status were applied. Time values were used for comparison in analysis, synthesis testing, and refinement and retesting. Process charting was used as an aid to recording current status; detailed report appendix B.
    (3) Process analysis flow charting,
    (4) Written standard procedure.

Questions that arose during investigation of the medication procedure were:

- The possibility of establishing a criterion for economic level of staffing within the available resources.
- The possibility of developing more detailed concrete and efficient means of planning and scheduling the work of the staff.
- The possibility for developing time values for control and staffing purposes.
- Does the day shift have a reasonably balanced workload? If not, what is the extent of the unbalance and when does it occur?

The study was carried out in the orthopedic service. General observation was followed by flow diagrams during the morning care procedures. This led to a written standard procedure. Standardized "preplan" procedures were also developed for each procedure. Appendix C shows before and after flow charts; articles are written on the technique and include standard stock lists and trays used in the new procedures.

(5) Term studies are discussed in chapter IV.
(6) Memomotion study.

A problem of traffic congestion in the main hall in the genito-urinary service that interfered with utilization of the nursing staff was studied. Direct observation was not feasible. A memoration motion picture camera was used, running at 50 frames per minute for 80 minutes at peak activity for one day. The provision of an additional nursing station and relocation of two stations resulted. A film print is on file.

(7) Layout studies were done in areas where deficiencies were seen as a result of the medication procedure investigation, e.g.; medications were kept in three places, only one area within the nurses' station. A nurses' committee worked with the investigator to establish: (a) preferred location of nursing station and treatment room, (b) internal layout of nursing station, (c) special desks for clerical work and charting, and (d) preferred location of nurses' station. Layout studies were continuing in other areas.
(8) Job manual. Nursing service authorities undertook the writing of a job manual that was felt necessary to effective management of nursing units. The head nurse job manual was in the process of being written by a nurses' committee.
(9) Correlation analysis. An attempt was made to conduct a correlation analysis for staffing criteria study (criterion for economic level of staffing). The relationship of staff numbers to average days of patient time in the hospital was analyzed at three levels of staffing. Correlation of number of nurses and average of patient days for a 4-month period revealed no significant relationship between the selected variables.
(10) Activity study. Mobility made it impractical to study work balance between morning and afternoon hours of the day shift. The head nurse assigned personnel to specific areas with corresponding task assignments. Before and after activity patterns are shown in appendix F.

Chapter IV is devoted to the problem of predicting the time required for a task. Problems underlying the stating of task times are: (a) technically, one of prediction, and (b) administratively, lack of expected task time is lack of an important element of planning and control methodology.

Task time predictions were needed in order that work may be planned so that the effect of alternate procedures could be assessed and so that abnormal happenings could be evaluated. Task times, it was stated, should be determined by time studies because informal estimates are likely to contain unrecognized provisions for unnecessary time expenditures.

It was decided to approach the problems on the hypothesis developed from the results of the morning care procedure, that all human work tends to form frequency distributions, at some level of unit sizes.

Process analysis reveals feasibility of identifying and defining the major tasks. It is then possible to break down tasks into steps. The task framework becomes clear and activities can be arranged to form a definite pattern, repetitive in nature.

A developed preplan made it much easier to secure time observations of tasks and prediction of task times because of (a) the variations introduced by a multiplexity of work plans, and (b) it was possible to approach the morning care procedure in terms of stated component tasks. Values and procedures used in developing task times in producing overall time for morning care is given in appendix E (p. 193). Time observations are made in two ways: (a) overall performance for a number of given tasks, and (b) time for single performance of a given task. (Task times—all tasks in the morning care procedure except bath and bedmaking were determined by the first method. An arithmetic average of time was considered adequate.)

Methodology used in the study of baths and bedmaking procedure was time analysis. Observations were made December 8 to 18, 1953, and January 5 to 27, 1954. The trial preplans were instituted November 11, 1953, and revised December 3, 1953.

Analysis of data.—As a result of analysis of time data and observational notes, dates were divided into: (a) tasks called for by and performed within the preplan, (b) tasks performed out of sequence and tasks not in the preplan but performed while the preplan tasks were in progress, (c) allowed departures, tasks necessary and unavoidable, and (d) non-allowed departures and unnecessary tasks.

Frequency arrays were made of baths and bedmaking times remaining in the first group; means and standard deviations were computed. Means for each of these tasks, for data of the two observation periods, were compared on the null hypothesis. The departures of means were found to be 0.23 and 0.33 in units of standard deviation of the difference of the means. It was concluded that data of both observation periods were taken from the same universe. It was concluded that performance under the preplan had become stabilized if data were taken a month apart. Data were combined and new means and standard deviations computed. Time required for the two tasks, they found, could be expected to vary from three causes: (a) condition of the patient, age, seriousness of the illness, and appliances in use on the patient; (b) individual nurse's concept of the required level of quality of care; and (c) individual nurse's method for performing the task.

None of these causes was considered controllable and none was considered subject to further restriction. It was decided that for daily control purposes, predictions should be based on arithmetic means. The average work situation was used as the basis of prediction to allow for a situation where there might be a high percentage of difficult patients. The prediction technique is shown. This plot shows average overall seriousness of conditions of the patient groups. The time per patient for "baths" and "bedmaking" varies inversely according to the number of patients. This indicates that the nurse has a good deal of latitude between what she does and what she needs to do. It was decided that one standard deviation each of "baths" and "bedmaking" should be added to the task times for the purpose of making staffing predictions. Resultant values were such that 92 percent of the observed "baths" values are equal to or less than the predicting value while the percentage is approximately 82 for "bedmaking."

The prediction values for morning care are determined as follows: (a) for daily control, sum of arithmetic means of all listed tasks, plus average allowed departure time encountered during "baths" and "bedmaking," and (b) for staffing-daily control, plus one standard deviation each of "baths" and "bedmaking" time.

The prediction procedure was field tested in two steps: (a) the head nurse recorded actual elapsed time for morning care and also furnished an estimate of a reasonable elapsed time to cover major activities not anticipated in the preplan; and (b) the head nurse was furnished a simplified, graphical means of predicting the elapsed time and these values were computed and recorded by the head nurse. Data collected for 23 days were described. Analysis of data collected after the 23rd day showed large variations between predicted finish time and both actual and adjusted finish times. This was due to a high percentage of easy to care for patients. Computations were adjusted by calculating prediction for average, minus one-half, and minus one standard deviation of "baths" and "bedmaking."

Analysis had been based on the assumption that one or another of the three predictor conditions applied to the entire unit. Because less than 100 percent of the cases showed 15 minute agreement, and because of instances of disagreement for all predictors, further investigations were made. It was discovered that patients in hall rooms had more serious conditions and had required more care. As a result the prediction procedure was modified. The head nurse was given three charts corresponding to the three predictors. Patients in wards and hall rooms are rated separately.

Computations were adjusted for the 30 days easy to care for patients. This expected condition is 1/18 or 5.5 percent. Original predictors functioned well for average conditions. The three conditions predictors had not been tested, but it seemed likely to bring agreement of prediction within 15 minutes.

Step two of the test was to establish control of time utilization. This was field tested by allowing shortage of supply of nurses to reduce the staff to the predicted level, one nurse or 17 percent less than what the head nurse had estimated as minimum staff, or two nurses, 34 percent, in situations of easy patients.

Findings:

- Lack of quality specifications and standardizations of detailed methods limit the accuracy of the prediction statement.
- Lack of uniform work planning for the team would reduce accuracy of predictors to a level a little better than the supervisor's estimate.

The procedure was considered practical for field use. When data for both observation periods were combined, sample size was 183 and 127 respectively.

Chapter V is devoted to rounding out the presentation. Difficulties under which the investigations were made were presented. These included the background values and attitudes of nursing, the status of the profession, and nurse-physician-patient relationships. Use of supervisory skills of the nurse, use of study techniques, and involvement of the investigator were limited by the privacy of the situation.

Work sampling studies showed unusual amounts of time in delay, standby, and not accounted for in observations. Check studies were made on standby time and orders of magnitude reported: (a) pace of staff not excessive, (b) activity peaks 8 a.m. to 11 a.m., lull 12 noon to 3 p.m., (c) an inefficient pattern during lull period, (d) uniform hour of completion of morning tasks, and (e) only general work assignments are made.

Pilot Study.—Questions presented from findings: • Is there unbalance of workload between morning and afternoon? • Are assignments sufficiently defined and detailed? • Is there loose control of crew's work? • Is there a satisfactory level of quality defined for each job and understood by the worker? A pilot area was established as a result of these questions.

Method.—Flow diagrams and preplans are instituted for 8 a.m. to 11:30 a.m. The aims in patient care are defined and the main purposes identified: (a) accomplish personal hygiene, (b) attend evaluation needs, (c) make required changes in patients' personal and bed linen, put bedside in order, and (d) accomplish required medications and treatments and other beneficial activities.

Findings.—Individuals largely planned their own work; numerous work plan adjustments were required. Examination of the work showed that it could be broken down into several one person jobs. The number of persons required depends upon staff available and time considerations. This was discussed with the staff. A preliminary writeup of the jobs and their steps was prepared, tested, and criticized by staff. Revision was issued and put into effect for the large wards and later for the rooms.

In development and use of preplans of work, group participation was elected. The investigator was available to the staff. Observations, e.g., flow diagrams, were shown. Purposes and premises were discussed with and evaluated by the group and suggestions elected, and recognition of realities in the situations was made. "Uniform preplan" was the term used to describe the change. "Allowed departures" were present since complete compliance could not be expected.

Results of the preplan showed a space saving of 25 percent and the same in time saving. An evaluation showed (a) increased calmness of staff and patients, and (b) a care plan rendered the planning problem more manageable.

Correlation analysis-criterion for economic level of staffing was computed. Kinds of activities to which nurses' time is allocated have been determined by these studies.

- The physician decides upon the course of medications, treatments, surgical measures, etc. Work sampling studies show this requires a small share of time.
- Another group of tasks, a routine observation of TPRs.
- Preparation of patients for surgery or laboratory procedures. Specimen collections, intake and output, and observations: these are also said to require little of the total duty time.
- The largest amount of nurses' time seemed to be spent in tasks done according to discretion and opinions of the nurses. "Patient comfort, maintenance of environment, psychological support of patients, patient education," etc., were used to test the effect of this type of patient welfare.

Patient Welfare Study.—The effect of available staff members on patient welfare was measured; the following assumptions were made:

- It would be possible to measure size of staff that would not allow for execution of task in only the first three groups;
- Increments in nurse staffing would reflect additional time being given to the discretionary elements of patient care;
- An unchanged medical staff during the experiment then variations due to individual differences in plans and policies for medical care would tend to cancel by random variations;
- Continuation of the experiment for a reasonable time as each level of nursing staff and medical conditions of patients would be represented in approximately a constant proportion at each condition of the experimental variable; and
- Larger proportions of discretionary care time would reflect in a reduction of the time the average patient would remain in the hospital. Average was determined to be 14 days.

A preliminary correlation analysis was made covering a 4-month period prior to the first study period.

The independent variable selected was the average number of patients per nurse per 24 hours for a 14-day period. The dependent variable was the average number of days the patient spent in the hospital during a 14-day period.

A Pearsonian Coefficient of Correlation was computed. It was determined that there was no significant relationship between the two variables. By use of a table of 5 percent and 1 percent points for x^{10}; it was estimated that a total of 200 pairs of observations would be required for a 5 percent level of confidence at the computed value of r 1. e – 0.14. Four hundred weeks of observation would be required to establish a significant relationship at the obtained value of r.

It was concluded that the selected variables were not appropriate and the 400-week period was too long because of economic reasons and difficulties in keeping the medical staff constant.

Group reactions are parallel to industrial experience; many similarities are found:

- Expectation that solutions to job problems lie principally in physical facilities provided by management;
- The conviction that "our work is unique" with respect to work planning and execution;
- The conviction that the existing plan of work is as good as can be worked out;
- Workers tire of fact gathering and exert pressure for action;
- The point of slump in interest, obvious lack of interest, departures from work, standards, etc.;
- Need for incentive of substitute awards for personnel are evident because of loss of self-determination of work plan and execution.

The Hawthorne research is reviewed in regard to incentives. The substitute awards (not defined) offered to the employers in the hospital situation were considered ineffective. It was concluded that: (a) substitute awards are doubly important in nonrepetitive work situations, and (b) it is a complex problem to determine what constitutes an effective incentive and must be determined from the viewpoint of the worker.

Application was not made for the following techniques: • synthetic time study, • micromotion study, • operation analysis, and • eliminated stopwatch time primarily because of the nonrepetitive nature of the work.

General conclusions.—

- This methodology was considered appropriate for all work up to and including the degree of nonrepetitiveness encountered in this investigation.
- As work becomes less nonrepetitive toward repetitive work, single standard time concepts become inappropriate and a standard budget becomes appropriate.
- Major problems in nonrepetitive applications are psychological; i.e., personal relation ones rather than technical ones.
- Need for appropriate incentives is more crucial in nonrepetitive work because of the complexities in human motivation.

Critique

The application of industrial engineering techniques to study in nursing situations is not uncommon. These techniques have been particularly useful in the assessment and improvement of staff utilization. However, the value of these studies has been limited, for the tasks of the nurse cannot be completely mechanized and the needs of patients and the quality of their care must be considered.

Hudson provides us with one of the earlier attempts to evaluate and improve procedures in the area of nursing. His study is reported from the viewpoint of an industrial engineer. Lengthy explanations are included to justify his application of procedures and techniques and to report his findings. He relies heavily on the opinions of nurses throughout the study. In some instances this was appropriate, but at other times, such as the assessment of personnel satisfaction, a more scientific approach was needed. The study is difficult to comprehend; it lacks continuity and its organization is confusing.

Traditionally, engineering techniques were applied in the assessment and improvement of repetitive tasks. Hudson's concern was the development of an approach in the assessment of nonrepetitive type tasks. Having identified the nurses' work as nonrepetitive, he attempts to assess the work of the nursing staff. Based on the works of F. W. Taylor, tasks are divided into elements to be timed. The methods employed in the identification of tasks to be assessed, the number of tasks assessed, and the numbers of techniques applied for improvement, are innovative.

The methodology involved the following: (a) *Operations of Investigation:* • record current status through observation, • determine through observation the aims of the function, • determine where excessive amounts of resources are being expended (analysis), • devise means of attaining aim with reduced expenditure of resources (synthesis), • test the operation, • refine and retest the operation, • test desired accomplishments against actual accomplishments (operational development); (b) *Find areas of greatest potential savings* (work planning) and assignment layout of work areas, work schedules, materials, and facilities; (c) *Extend study coverage* at the gross level where greatest savings lie; (d) *Use time values* for studies and basis for control; and (e) *Secure the cooperation* of the study group.

Ten engineering techniques and devices were applied: • work sampling studies, • process analysis then flow diagrams, • process analysis then flow charting, • written standard procedures, • time studies, • memomotion studies, • layout studies, • job manuals, • correlation analysis, and • activity studies.

The framework of the study is developed. Rationale for the study is sound. Literature reviews of nursing and of industrial engineering are included. Personnel involved in the execution of the study are well qualified; very able nursing consultants provided assistance in the execution of the study.

Tools used in the collection of the data are only briefly described and not included in the study. Actual data collected are reported in vague terms. Findings are reported in detail and appropriate charts and graphs included. Personnel are oriented to the purpose of the study. Personnel reactions to changes are observed but no scientific assessment is provided. Quality of care is not assessed.

This appears to be a large, comprehensive study. Deficiencies in reporting make it impossible to assess its real value. Persons interested in identifying problem areas in nurse utilization, assessing problem areas, and employing methods for improvement will find this study useful. Lack of information in regard to the collection of data and the absence of the assessment of patient care quality limits its contribution to nurse staffing research design.

A27. Hughes, Frank. "The Effects on the Registered Nurse of the Increasing Use of Non-Nursing Personnel in the Hospital." Unpublished Master's Thesis, University of Toronto, Ontario, Canada, July 1968.

Review

Purpose.—To discover if there are any identifiable effects on registered nurses from the increasing use of nonnursing personnel in the hospital. Then, if such effects can be identified and described, to suggest some possible courses of action that would lead to increasingly effective and efficient hospital operation with better quality patient care through the proper application of existing and known potential resources.

Method.—A 285-bed, active treatment, general, teaching hospital in Toronto, Ontario, was the location of the study. Data for the study were collected August 1962 through May 1963. Formal interviews and "timed interval studies" on the nursing unit were abandoned as invalid. Informal questioning and observation replaced the formal method—this the author called the incident approach technique. Interviews involved nurses, nonnursing supervisory and administrative personnel employed by the particular hospital under study. Frequency of a particular subject area mentioned in an interview and frequency of a particular activity observed by the author constituted the data.

Findings.—The general effect (according to nursing opinion) of the increasing use of nonnursing personnel in the hospital has been the ever decreasing status of the nurse. This, the author states, is due to (a) the historical development of hospital administration as a superior power; and (b) the lack of nursing authority over nonnursing personnel (in areas of housekeeping, supplies, etc.). The author says present tension exists because the head nurse feels a loss of status through lack of participation in decision making that affects nursing, and also because her experience and responsibility are not reflected in salary scale. The nursing department is not given commensurate authority to carry out its function as effectively as it could in the particular hospital under study. The author concludes that a "Nursing Unit Administrator" should have authority over all matters within her unit, nonnursing as well as nursing and that a "Nurse Specialist" be solely responsible for the administration of patient nursing care on the unit. Statistics in the Toronto hospital showed that, although the head nurse did not have department head status, her administrative responsibility was often equal to or greater than that of nonnursing department heads. The author states that, in order to attract men into the profession, nursing should abolish the female symbols in uniform. The author concludes from his research that nursing positions should recognize experience and added education exposure to allow for advancement within the hospital setting.

Critique

This study, one which uses descriptive approach primarily, is very local and cannot be generalized or replaced. Its value lies primarily in its suggestion that nursing be organized differently: a Nursing Unit Administrator for total responsibility and authority for all activities and a Nurse Specialist for patient care. It describes the amount of administrative responsibility carried by individuals in nursing positions without the status to accomplish the task.

A28. Huseby, Robert D. "Impact of Nursing Design on Patients' Opinion." Unpublished Master's Thesis, University of Minnesota, Minneapolis, Minnesota, 1969.

Review

Purpose.—The major purpose of this study: "to assess differential effects of three nursing unit designs on the patient's subjective feelings as reflected in the patient's opinions about care received, physical surroundings, and external environmental disturbances on radial, double corridor, and single corridor units."

Five hypotheses are stated:

- The patient's satisfaction with the characteristics provided them is associated with the design. The characteristics examined are: promptness, willingness, courtesy, and dependability.

- The patient's expectations and perceptions of the nursing staff are associated with the design. Examined are: comparison of nursing care received and that expected, comparison of number of nurses expected and the number available, and the patient's perception of staff fatigue.
- The patient's reactions to external environmental disturbances, occurring day and night, are associated with design. These disturbances are light, visitors, nursing activities, roommate, and noise.
- The patient's feelings related to room are not associated. These feelings are overall satisfaction with the room and the size of the room, the comparison of expected room charge and actual room charge, privacy, and boredom.
- The patient's self-reported feelings indirectly reflecting security are related to nursing unit design.

Method.—Questionnaires were administered to 814 general care patients. The criteria for the sample for the patient population were: • hospitalization of at least 3 days' length; • not so ill as to be unable to answer questionnaire; and • general medical or surgical problems. The patients varied in type of nursing unit design to which they were assigned. They were placed in one of three types: radial unit, double corridor unit, or single corridor unit.

A standard procedure was used for the data collection. A questionnaire was specifically built to obtain opinion scores about nursing services provided, expectations and perceptions of nursing, the disturbances on the unit, satisfaction with rooms, and self-reported statements reflecting feelings of security. The Likert method of fixed alternatives to replies was used. The instrument was field tested, but no attempts were made to provide reliability checks or determination of its validity.

Data on 12 control variables were collected: age, number of days hospitalized, number of times hospitalized, surgery (performed or not), type of accommodation (private or semiprivate), marital status, education, city size, sex, transferred or not, sense of well-being, and Patient Control Index. No effort was made to control amount of staffing on the nursing units or to obtain data about the staffing.

The data were analyzed by chi-square and multiple linear regression techniques.

Conclusions.—The results were reported in tabular and in narrative form. In brief, these are the conclusions: overall, patients on radial and double corridor units had significantly more favorable opinions than patients from single corridor units. Total opinion scores were favorably influenced (significantly) by increased age of the patient, those who were not transferred, those who had surgical intervention, and feelings of well-being. Patients on radial and double corridor nursing units have more favorable impressions of the characteristics of services provided by the nursing staff than do patients on single corridor nursing units. Although patients on radial units report more disturbances, they also are more satisfied with their rooms than are patients in linear nursing units.

Critique

Little is known, or has been pulled together from research studies, about the relationship of architectural variables to patient satisfaction, nurse staffing, or nurse satisfaction. This study is an ambitious one, carefully conceived, designed, and carried out but unfortunately limited in some highly significant aspects.

The literature review drew upon a few studies that have examined architectural features. However, the author made no reference to the psychological literature dealing with the studies or theories of emotional support or to the importance of social interaction.

There is no statement in the study about the amount and kind of staffing on the nursing units used in the research, a variable that could readily influence the amount of satisfaction expressed by the patients. The evidence supporting the reliability and validity of the questionnaire used for data collection is likewise missing. These oversights are unfortunate, especially since knowledge about architectural variables and their effects is needed and could be useful in making staffing prediction.

A29. Illinois Study Commission on Nursing. *Nurse Utilizaton: Illinois, A Study in Thirty-One Hospitals.* Vol. III. Supported in part by USPHS Contract PH 108–68–28, The Illinois League for Nursing, Illinois Nurses' Association, 1966–1970.

Review

Purpose.—This study contains the principal findings and recommendations of a study of nurse utilization in 31 selected Illinois hospitals. The Illinois Study Commission on Nursing authorized this study, which identified some characteristics of individual hospitals and the communities where they are located that seem to affect nurse staffing. *Hypotheses:* (a) The major determinant of need is the number of patients and their dependence on nursing personnel. The hospital is influenced by the patients in a community for a certain quality and quantity of nursing care.

(b) The size of staff is influenced by size of nursing pool in community, financial resources of the institution, and efficiency of hospital management and nursing service management.

All variables were examined in relation to quality of nursing and cost of hospital care.

Sample.—The 31 hospitals selected for this study ranged in size from 56 to 720 beds and were well distributed throughout the State.

Instruments.—Data were collected in 10 separate studies: • staffing, • classification of patients according to their nursing needs, • patient and personnel satisfaction with nursing care, • personnel charactertistics, • turnover, • total hospital manpower, • hospital administration profile, • nursing administration profile, • assignment of activities, and • traffic patterns. Forms were either based on previous studies or prepared for this study.

Procedure.—Data were machine tabulated and subjected to multiple regression analysis at the University of Illinois to determine how much of the variation in staffing could be explained by the various factors studied.

This study documents practices related to nurse utilization. The factors involved in nurse utilization are described.

I. Nurse staffing and number of patients are examined in terms of size of hospital, size of nursing units, and single- or multiple-bed patient rooms.

There was a negative relationship between NHPD (Nursing Hours per Patient Day) and bed size. (4.47 NHPD in 13 hospitals with less than 149 beds to 4.01 NHPD in six hospitals with more than 300 beds.) There is a larger percentage of registered nurses and licensed practical nurses in large hospitals. (31.5 percent registered nurses, 10.7 percent licensed practical nurses, and 57.8 percent aides in small hospitals and 35.9 percent registered nurses, 14.8 percent licensed practical nurses, and 49.3 percent aides in large hospitals.) The larger hospitals have a lower percentage of total personnel in the nursing department. (54.1 percent in nursing department in small hospitals and 41.3 percent in nursing department in larger hospitals.)

NHPD by paid personnel decreased as size of nursing unit increased. (Nine units with less than 15 beds averaged 4.76 NHPD total paid personnel and 15 units with more than 50 patients averaged 3.87 NHPD total paid personnel.) Larger nursing units reported lower NHPD by registered nurses. "However, both patients and personnel felt that patients received better care on the smaller units." "The number of beds, rather than the average daily census, influenced the basic staffing patterns."

"NHPD provided to total staff was not appreciably affected by the percentage distribution of beds between private and multiple-bed rooms." The highest percentage of registered nurse hours was on units with the greatest number of private rooms.

II. The relationship of nurse staffing to patients' needs was examined by the type of clinical unit to which patients were assigned and the dependence level of patients.

Intensive care units showed the greatest range in NHPD (10.3 to 20.9). NHPD in pediatric units ranged from 4.15 to 7.76. The registered nurse staffing for medical and/or surgical units was uniform. "There was no significant difference in NHPD on the general units in hospitals with or without specialty units." Variation in nursing hours per surgical operation varied from 1.9 to 15.4. Hospitals with the highest percentage of major operations had the highest percentage of aide time in the operating room. Range of nursing hours per delivery in obstetrics was 3.6 to 41.9. In most emergency rooms, coverage at night is provided by nurses on call from other departments. One of three of the night emergencies are admitted to the hospital.

Nurse staffing was also examined in terms of dependence of patients on nursing personnel. The Johns Hopkins system of separating patients into total care, partial care, and self-care categories was used to determine direct nursing requirements. Direct nursing requirements per patient day ranged from .89 to 1.34 hours. (Time requirements are calculated from the assumption that total care patients required 2.5 hours, partial care patients required 1 hour, and minimal care patients required 0.5 hours of nursing care.) As patients' requirements increased, nursing hours per patient day decreased. "Patients over 65 had 50 percent more direct nursing care needs than those under 65. . . ." Patient care requirements were highly related to length of stay. Patients in intensive care units received more care. Patients on medical units had more needs than those on combined medical-surgical units. On surgical, minimal care, and extended care units there was no relationship between nursing requirements and NHPD. Direct nursing care requirements varied considerably from day to day.

III. In order to examine staffing and adequacy of care, 8,000 questionnaires from patients and personnel were reviewed. The primary concern of patients was knowing what was going to happen. Patients were more critical of environment than of care received. "In the multiple-regression analysis no relationship was found between NHPD by all personnel and patients' evaluation of adequacy of service." Promptness of answering calls and feeding patients were directly related to the percentage of aides on the staff. "Regarding dietary needs . . . there was unanimous agreement that hospitals over 300 beds are not meeting patient expectation." (This report refers to other indications of the relationship between staffing and adequacy of care but the method used to interpret these results from the questionnaire is not included.)

IV. The number of registered nurses employed and the percentage of nursing of registered nurses in the county in which the hospital was located were analyzed. Active registered nurses per 100,000 population in counties ranged from 123 to 552. Ratio of hospital beds to nursing home beds is 1:5 in the communities studied. There were more registered nurse hours provided in the 17 hospitals that offered clinical experience preparatory for registered nurse licensure. About one in three registered nurses in Illinois were inactive in 1966. The budget vacancies for registered nurses ranged from zero to 56. There was 258 unfilled registered nurse positions, 200 budgeted licensed practical nurse vacancies, and 208 vacancies for aides. There was no relationship between total nursing hours, registered nurse vacancies and registered nurse salaries. "In nearly half the hospitals when registered nurse hours were high, nonregistered nurse hours were high, and when nonregistered nurse hours were low, registered nurse hours were also low."

V. To demonstrate that management factors do affect productivity of nursing personnel, characteristics of hospitals that affect productivity were defined. Productivity of nursing personnel was defined as NHPS. "The data showed no significant relationship between input (NHPD) and output (requirements for care, adequacy of services)." Therefore, hospitals with low nursing hours were more productive than those with higher hours.

The characteristics of hospitals that affect productivity are factors that are not subject to management control, such as size, range of services, occupancy rate, length of stay, type of control, ratio of doctors to registered nurses, and characteristics of the community. Other characteristics that influence management decisions are budget, activities assigned to various departments, traffic patterns, supporting services, and use of labor saving devices. (This report describes many relationships between certain characteristics of hospitals and nursing hours per patient day.)

VI. Characteristics of nursing administration in hospitals where good utilization is practiced need to be identified. Nursing leadership, nursing personnel, patterns of assignment, traffic patterns, and morale of personnel are studied.

All nursing services were under the direction of a nurse. One director had preparation at the doctorate level, six at the master's, and 11 at the baccalaureate level. The department of nursing appeared to be set up with responsibility flowing from director to assistant director to supervisor and to head nurses. "An index was developed consisting of 35 items considered to be elements of good nursing service administration." A high index was related to higher hours per patient day by total personnel. No relationship was found between index and registered nurse hours. There was a strong positive relationship between nursing service sophistication index and the hospital sophistication index. There was an average of 5.7 (range of 0 to 14) administrative nursing personnel for each 100 nursing personnel.

Characteristics of nursing personnel showed the number of personnel by category and by full- or part-time status in terms of average length of employment, average age, percent married, percent with children under 18, and percent with academic degrees. The distribution of nursing personnel among services, on different days of the week and on different tours, and the mix of nursing personnel is described.

Head nurses were asked to indicate to whom they assigned 334 nursing activities. Seventy-two activities, relating to planning and evaluating care, communicating, therapeutic nursing measures, and general management activities, were selected for scoring. More nursing hours were expended where there was a poor use of nursing skills. This was indicated by a choice of personnel to perform an assignment that could be done by someone with lower skill. Head nurses appear to be the most often misutilized. Staff nurses and team leaders were not given the opportunity to assume activities of planning and evaluating care.

Measures of length of trips and number of trips by each employee in each type of unit not only reflected architectural efficiency but the extent to which nursing personnel accommodate to the architecture. The average number of feet traveled per trip was 25.6 (range 11.5 to 48.8) and was related to NHPD by total personnel.

A group of questions to measure personnel satisfaction with patient care shows that all personnel felt the nurses had too much work to do. There was no relationship between the responses on the questionnaire to NHPD, but the more head nurses and supervisors NHPD, the more satisfied were the employees.

Results.—A multiple equation is designed to predict nurse staffing. The dependent variable in NHPD is based on a set of the independent variables. The method of least squares is used to find the values of the contents (the strength and direction of each independent variable in its relationship to the dependent variable). The most significant equations, computed from over 100 different sets of independent variables tested through multiple regression equations, are based on the following factors: patient requirements for nursing services, average number of feet involved per trip, assignment of activities index, size of hospital, and percent of nursing personnel employed part time. Another model was derived for hospitals that do not make use of previous studies (Johns Hopkins, Yale, etc.). The variables are occupancy rate, presence of school of nursing for registered nurses, size of hospitals, total professional nurses in county, and per capita income.

This report of Volume III of the Illinois Study Commission on Nursing includes the summary, recommendations, and conclusions that are found in Volume I.

Critique

The review of this study is given following the methodological report that is reviewed.

A30. Illinois Study Commission on Nursing. "Nurse Utilization in Thirty-One Illinois Hospitals–Methodological Report." Supported in part by USPHS Grant PH 108–69–28. Laboratory data presented to staff members of the Division of Nursing, USPHS, in Washington, D.C., December 1968.

Review

Purpose.—The purpose of the study was to identify significant factors affecting nurse utilization and to develop a predictive model that would permit a hospital to forecast change of staffing levels in response to changing operating variables.

"The basic purpose of the design of the study was seen as an assessment of the extent to which a set of characteristics of a sample of Illinois short-term general hospitals are related to the nursing hours per patient day (NHPD) provided by the hospitals."

"The hypothesis is that the nursing hours per patient day provided by the hospitals are influenced by a number of factors: patient factors, personnel factors, hospital factors, and nursing service administration factors. Patient factors include requirements for nursing service and assessment of adequacy of care. Personnel factors include personnel attitudes toward adequacy of care, length of employment, turnover and stability, part-time and full-time distribution, marital status, average age, educational status, number of dependents, and salary. Hospital factors include size, control, area served, architectural efficiency, administrative sophistication, organization of medical staff, salary devices, and formal communications systems. Nursing service administration factors include organization of nursing units, formal communication system, and delegation of nursing responsibilities. These factors were grouped into three classes of variables: patients' requirements for nursing services, adequacy of services provided, and efficiency with which the services were provided.

In order to select the sample for this study, questionnaires from 197 Illinois hospitals were made available by the AHA. The 1966 AHA-PHS study of Manpower Resources in Hospitals report revealed the data necessary to calculate nursing hours per patient day in Illinois hospitals. The 101 short-term non-Federal hospitals in Illinois that were members of the AHA Hospital Administration Services System were delineated as the population. Large hospitals with medical school affiliation were eliminated from the total population. The remaining hospitals were divided into 10 geographical areas and then subdivided into three groups representing high, medium, and low average hours of nursing care per patient per day. From each of these groups the sample population was randomly selected. Two of the 30 hospitals asked to participate could not give time to the study and were replaced by alternates. One additional hospital was asked to participate and was used in the study as a control.

Instruments—The instrument used to classify patients according to their nursing needs was based on "A Method of Allocation of Nursing Personnel to Meet Inpatient Care Needs," John P. Young, Johns Hopkins Hospital (Operations Research) October 1962. The study of patient and personnel satisfaction was based on the questionnaires developed by the USPHS. Instruments used in the study of traffic patterns were adopted from the Yale University Studies of Hospital Function. The other data collection instruments were developed to fit two criteria: they must be self-administered and yield quantitative scores. These original instruments were developed for many of the factors studied and were not tested elsewhere.

For some of the variables defined in this study, weights were derived from a group of knowledgeable nurses. Items were rated in terms of their contribution to nursing hours per patient day, patient satisfaction, or cost per patient day. A forced choice technique was used. There was much agreement among raters.

Procedure.—The first draft of a proposal for this study was prepared by Dr. Eugene Levine of the Division of Nursing, USPHS. The proposal was discussed with the Institutional Nursing Committee and Charles Flagle, Ph.D., of the Operations Research Department at the Johns Hopkins Hospital. Factors to be assessed were outlined and the possibility of developing a mathematical formula was proposed.

Three groups of independent variables (patients' requirements for nursing service, adequacy of service provided, and efficiency with which services are provided) were related in a multiple regression analysis in which the dependent variable would be nursing hours per patient day. Multiple regression technique was also used to examine the relationship between selected efficiency factors and per patient day expenses and adequacy of service.

To obtain adequate descriptive information about each hospital, 10 areas were studied. These were • staffing • classification of patients according to their needs, • patient and personnel satisfaction with nursing care, • personnel characteristics, • turnover, • total hospital manpower, • hospital administration profile, • nursing administration profile, • assignment of activities, and • traffic patterns. Supplementary information was obtained from the "Guide Issue" of *Hospitals*, the Hospital Planning

Council for Metropolitan Chicago, and the Illinois Department of Health.

Study directors and alternates from each hospital participated in an all-day instructional workshop where they received copies of the data-collection instruments and the purpose of the forms. Data collecting continued through a 2½ month time span.

Data collection and processing of each part of the study is considered separately.

Staffing. The dependent variable of the study is the ratio of nurse staffing to patients. To obtain this "hours of care per patient day" figure, data were collected for 7 days (every other day for 2 weeks). Six forms were developed to obtain factors relating to workload in inpatient care units, operating room, emergency room, labor and delivery, administrative nursing, and outpatient services. Each form asked for sex of employee, full- or part-time status, job category, job title, assigned hours, actual hours worked, off-unit time in minutes, and remarks. All hospitals included data for one full week on 392 units. Attempts were made to check data by calling the director of nursing or study director.

Personnel Characteristics. Forms prepared for professional nurses and auxiliary personnel asked for marital status, number of children under 18, sex, age, full- or part-time status, job title, unit to which assigned, length of employment, preparation, and licensure information. Data were collected from 7,364 employees. The number of employees was checked against the data from the study of turnover.

Turnover Study. Data were collected from 6,467 on the payroll in 1966 and 7,188 on the payroll in 1967. Turnover and instability rates were computed from the following formulas:

$$\text{Turnover} = \frac{(\text{Number of personnel who left before } 4/1/67 \times 100)}{(\text{Personnel on payroll } 3/31/66) + (\text{Personnel on payroll } 4/1/67) \div 2}$$

$$\text{Instability} = \frac{(\text{Number of personnel on payroll } 3/31/66 \text{ who left before } 4/1/67 \times 100)}{(\text{Number of personnel on payroll } 3/31/66)}$$

Patient Care Study. Forms were duplicated from *Patients and Personnel Speak.* Data from 3,643 patients and 4,489 personnel were received. Results were compared with the USPHS study and found to be within the expected range. Scores included the percentage reporting an event as having occurred and a weighted score for each category.

Patient Classification Study. Forms to measure the work-load were the same as those used at Johns Hopkins Hospital. Data collection was to be started on a certain day and continued until 1,500 patient days had been classified. Only 22 hospitals classified 1,500 patients. The range of patient days classified in the hospitals was 813 to 1,838. Class III patients ranged from 11.3 percent to 40.4 percent. "The sample checked for validity showed less than 4 percent error."

Hospital Administration Profile. The Hospital Profile form was based on the 1966 "Guide Issue" of *Hospitals* and a previous study by Dr. Levine. Students in the Nursing Service Administration class at Catholic University in Washington, D.C., developed weights for each item on the basis of the extent to which each influenced nursing hours per patient, patient satisfaction, and cost to the nursing department.

Nursing Service Administrative Profile. This form was adapted from "Criteria for Evaluating a Hospital Department of Nursing Service," NLN, 1965, and the "Standards for Organized Nursing Services," ANA, 1965. One questionnaire was received from each hospital. The items were weighted by the class in Nursing Service Administration at Catholic University and regrouped.

Assignment of Activity. Each form contained 333 activities that might be performed by nursing personnel. The items were arranged alphabetically to assure separate consideration. Two hundred eighteen questionnaires were returned. Seventy-two items were selected for scoring and separated into groups: administrative responsibilities, clerical duties, housekeeping, equipment and supplies, nursing care, etc. The items selected for scoring were based on "A Study of Nursing Functions in General Hositals in the State of Minnesota," by Hanson, 1955, and "What Do Nurses Think of Their Profession," by Bulloch, 1954. "A small group of nurses then suggested the appropriate level of personnel assignment for each item." The decision was that data were not collected in a way to reliably show utilization or misutilization on a nursing unit.

Traffic Patterns. The section of "Yale Studies of Hospital Function and Design" entitled "Inpatient Unit Traffic Study" was used as a model for the Illinois Study. Data were collected on all units (except operating rooms, recovery rooms, labor and delivery rooms, and the nursery) for 3 days by most of the hospitals. A comparison with data from the Yale study shows similarity. Using the Yale formula for determining architectural efficiency of a unit, some intensive care units had low architectural efficiency. Identical floors received different architectural efficiency values.

Repeat of Manpower Study. Data were collected on forms provided by AHA during the same week as the previous year. Forms were sent from each hospital. The average nursing hours per patient day increased from 5.03 in 1966 to 5.19 in 1967.

County and Community Profiles. Three profiles (hospital, community, and county) were made of data collected throughout the study period. Calls to the hospitals showed discrepancy between beds in use and the official bed count.

Hospital Administrative Services Data. HAS reports were used to obtain such descriptive data as pounds of laundry per bed, laboratory tests per admission. Five hospitals did not have HAS reports so information was gained from: (a) statement of revenues and expenses, (b) operational and departmental indications, and (c) statistical reports.

Eighteen Month Census. Forms asking for census for each month from April 1966 through September 1967 were obtained from each hospital. An 18 month average could only have been obtained if total patient days per month had been requested.

Area Served. None of the information was used concerning whether the hospital was a referral hospital or served only the local community.

Volunteer Study. This form was designed to show that volunteer service might reduce nursing workload. Forms were received from 24 hospitals. The number of hours provided by volunteers was much greater than that listed on the staffing forms.

Bids were received from nine organizations regarding the cost of analyzing the data from this study. The Research Resources Laboratory at the University of Illinois processed the data and did the multivariate analysis.

Original data from three questionnaires were keypunched. These forms were the Hospital Profile, Nursing Service Administration Profile, and the HAS Reports. Some forms were tabulated by hand before they were keypunched.

Dr. Levine prepared a series of documents to be used by the computer staff. Variables to be included in the mathematical analysis were identified. Computation of dependent and independent variables was explained. A list of multiple regression equations and tables was prepared.

"When the computer runoffs began to appear it became clear that the analysts did not have sufficient understanding of hospitals to do creative analysis."

Results.—A series of tables was prepared that became the basis for a written report to the 31 participating hospitals. The rank placement of each hospital on the 14 factors studied was prepared.

Four of the 10 subsections of this study used methodology developed for other studies.

Findings from patient's assessment of adequacy of nursing care, category of personnel, traffic study, and percentage of patients over 65 were similar to the original study for which the instrument had been prepared and first used.

The time measure for indirect care was based on Johns Hopkins methodology that a constant of 20 hours per 8 hours of duty was needed. Adding the direct care requirements for the 30 hospitals in this range showed a range of 2.93 to 3.35 of nursing hours per patient day. If the AHA Nursing Activity Study results showing that indirect care requires 50 percent of the nurses' time were used, the nursing hours per patient day in the Illinois hospitals would range from 1.86 to 2.70. This is well below the CASH goal of 4.00 per patient per day.

On nearly every unit there was a marked variation in nursing hours per patient day on different days of the week.

The rationale that staffing patterns are logically developed seems to be questionable.

The assignment of activity study showed lack of assessment of patients' nursing needs. Patient classification study showed that on some units as many as 5 percent were Category III patients.

Part-time personnel were not always used to supplement the time of full-time nurses as indicated by part-time nurses being alone on a unit for successive days.

Summary of findings.—

- "Variations in NHPD from hospital to hospital (3.78 to 5.50) were substantial."
- "The study furnished substantial evidence of poor scheduling techniques." Most of the hospitals determine their staffing needs on the basis of numbers of beds rather than on the basis of patient census.

- In hospitals with nursing education programs, the nursing hours per patient day varied even more than the other episodic patterns.
- "The drop in NHPD on weekends is almost entirely attributable to reduced coverage by aides."
- "There was a widespread tendency for nursing staff to carry out activities that could be delegated to individuals with lower levels of skill or educational attainment."
- "Over half (56.3 percent) of the nursing care on inpatient units was given by staff other than RNs."
- "The average number of feet per trip traveled by nursing personnel related dramatically to the NHPD at the same hospital."
- "The larger the nursing unit, the lower the ratio of RNs to patients."
- "Larger hospitals have more stable workloads and greater potential for staffing for optimum utilization."
- The fluctuation occupancy in intensive care and maternity services was a major factor in the extreme variation in nursing hours per patient day.
- "The study furnished no evidence that having an intensive care unit reduces nursing needs or nursing hours in other areas of the hospital."
- "The use of labor-saving devices as measured in this study did not produce a decrease in NHPD."
- "The distribution of beds by category of accommodation (private, semiprivate, multiple) had no apparent relationship to total staff assigned."
- "Hositals with the highest salary levels in nursing tended to furnish lower NHPD."
- "There was no apparent relationship between level of nursing salaries and RN vacancy rate."
- "In the 31 hospitals studied, the staff nurse earned 90 percent of the head nurse's salary, and the head nurse earned 95 percent of the supervisor's salary. Only five of the 31 hospitals offered a premium starting salary to graduates of baccalaureate programs."
- "There was a weak direct relationship between the measured requirements of patients for nursing care and NHPD." Additional needs for service seemed to be met by practical nurses, aides, and orderlies.
- "No relationship was found between NHPD by all personnel and the patients' evaluation of adequacy of service. Nor did the presence of more RNs seem to affect patients' estimation of nursing adequacy."
- "Patients tended to be more critical of their environment (noise, ventilation, comfort of rooms) than of the nursing care they received."
- "Prompt response to patient calls, prompt feeding, and sensitivity to the patients' other personal needs were directly related to the percentage of aides on the staff."
- "The study showed no significant relationship between nursing input (NHPD) and output (patient care requirements and the feeling that these requirements are met)."
- "The staff RNs in the study hospitals were notably stable employees, having served an average of nearly 4 years (46 months) on their jobs. Head nurses had even longer tenure—an average of 7 years on their jobs. Thirty four percent of all nursing personnel in the 31 hospitals had been on the job at least 5 years.
- The higher the sophistication of nursing service administration as measured in this study, the greater the number of nursing hours per patient day.
- Hospitals that are well supplied with nursing supervisory personnel tend to attract more registered nurses.
- "Ward clerks were used extensively by study hospitals to relieve nursing of paperwork functions, but their use was limited on the evening and night shifts and on weekends."
- "The study hospitals are extending the operation of services needed to support nursing, thus permitting an increasing concentration of nursing on patient care functions."

Conclusions.—

- There was no evidence to suggest overstaffing by reigstered nurses.
- "There is great potential for improving utilization of the nursing aides and to a smaller extent the licensed practical nurses."
- "Patient satisfaction with nursing service related clearly and directly to the relative abundance of nursing aides and to the proportion of their time represented in NHPD."
- "Much of the 'conventional wisdom' about ways to achieve effective nurse utilization could not be supported in this study."
- "The internal day-to-day controls that can be applied to make nursing service more efficient are

less significant in their impact than the size and design of nursing units, the establishment of intensive care and other specialized services and the basic decision to establish the hospital." "This study documents the inefficiencies of having too many under-occupied hospital obstetric departments, too many intensive care or cardiac care units, and too many small hospitals."

- "Regarding the design of the nursing unit, the study suggests that the objectives of adequate patient service, as viewed by the nurse, and effective nurse utilization tend to come together in the size range of 30 to 32 beds."
- "Study findings on average length of service by staff and supervisory nurses in the surveyed hospitals tend to explode the popular assumption that the RN is a high-turnover employee."
- "There is substantial misuse of nursing time when ward clerks are not on duty."
- "The questions of whether the nursing unit is overstaffed or understaffed and whether or not nursing personnel on the unit are well utilized cannot be answered out of the context of patient care needs as determined by professional judgments."
- "Unquestionably, relatively high turnover rates create the circumstances and the climate for ineffective utilization."

Recommendations.—At the education level, it is recommended that the study investigator help hospitals develop their own program for nurse utilization based on data from that hospital. The investigator should develop a workshop in techniques for improving nurse utilization. A course for nurse leadership should be offered. A program for interhospital comparison of NHPD should be established.

At the hospital level, every hospital should undertake a study of how nursing aides are used. A "Nursing Care Review Committee" should be established. There should be continuing dialogue between nursing service and nursing education. Personnel policies should be examined. Hospital administration should examine round-the-clock, 7-day week supportive services. Hospitals should study more efficient patterns of organizing workload.

At the planning agency level, effective use of nurses and other health manpower should be considered. Channels should be opened between Health Education Commission and local planning agencies. Local health planning councils should produce more effective utilization of nurses on a community basis.

The Hospital Licensing Board of Illinois Department of Public Health should review policies segregating delivery rooms from general surgery.

National nursing organizations are encouraged to establish methods of measuring quality of nursing care.

Critique

This study presents an attempt to identify significant factors affecting nurse utilization from a study of current practices and to develop a predictive model that would permit a hospital to forecast changes of staff levels expected as operating variables change. The very nature of this problem encompasses the study of many variables. The dependent variable studied was the ratio of nurse staffing to patients, expressed in hours of care per patient day. Independent variables are placed in three groups: patient requirements for nursing service, adequacy of service provided, and efficiency with which services are provided. Descriptive information about each hospital was obtained for 10 areas: staffing classification of patients according to need, patient personnel satisfaction with nursing care, personnel characteristics, turnover, total hospital manpower, hospital administration profile, and traffic patterns.

The theoretical framework of the study is not developed in this report and a literature review is not included. A very able consultant staff was used in the initial planning of the study; however, there is evidence throughout the study that there was exceedingly poor planning in its development. Frequent changes are seen during the progress of the study as to what should be measured and how measurements should be made.

The instruments used are poorly described and samples are not included in the report. The instrument used in the assessment of nursing needs was developed at Johns Hopkins University. Patient and personnel satisfaction was assessed by an instrument developed by the USPHS and the traffic pattern study instrument was adopted from the Yale University studies. Two instruments developed by the investigators are based on criteria concerned with ease of completing and scoring with no consideration given to its measurement qualities. Data collection sheets are admittedly put together during the course of the study and used without testing. In some instances, instruction sheets accompanying questionnaires were unclear, and less than satisfactory information was obtained from them.

The sample is large, consisting of 31 selected general hospitals. Attempts to randomize the selection of hospitals were not accomplished. Exclusion of large hospitals made it impossible to generalize the findings.

Study directors assigned for each hospital appear to be of varied backgrounds, which would alter the uniformity with which the study was carried out. The training course for study directors is mentioned but not described. Orientation of involved personnel is not included. These factors are significant if consistency in study design was to be achieved and maintained among hospitals.

Tables of results are referred to but are not provided in this report; only general results are reported. It is difficult to conceive how the data collected could lend themselves to statistical analysis and provide their investigators with any meaningful results.

The problem that was approached in this study is an urgent one. The opportunity to include such a large area for study seldom occurs, considering the time, effort, and cost of execution that must be involved. It is most unfortunate that better planning and execution of this study did not occur. The investigation recognizes and reports many of the deficiencies encountered. The initial design is interesting and the inclusion of many variables to be studied is innovative and exciting.

A31. Ingmire, Alice E., and Taylor, Calvin W. *The Effectiveness of a Leadership Program in Nursing.* (NU 00078) Western Interstate Commission for Higher Education, Boulder, Colorado, February 1967.

Review

Purpose.—The aim of research was to investigate the effectiveness of a continuing education leadership program in nursing designed to improve the skills of nurses in administration, supervision, and teaching.

Method.—Location was the University of Utah. The project was carried out in 12 Western States by eight Western university schools of nursing between 1962 and 1964.

Eight measuring devices were used to assess the impact of the continuing education program upon attitudes, beliefs, and behavior of the participants. Overt behavior was measured by a nursing situational exercise and a form for rating on-the-job leadership and interpersonal skill completed by one superior and three subordinates. Paper and pencil tests included the Nurse Opinion Inventory developed by Nahm and Todd Personal Relations Test Part I and Part II. Experimental Group was also given a Biographical Inventory, A Registered Nurse's Self-Description Scale, and a Registered Nurse's Satisfactory Achievement Scale, all developed by Dr. Taylor.

Sample.—Four hundred ten nurses participated as experimental subjects in this research. Approximately 450 nurses served as control subjects. Attempt was made to match the marital, educational, and employment characteristics. Three hundred seventy-seven experimental and 352 control subjects were compared on 39 variables representing their scores on the before and after participation in the situational exercise, the ratings received from superordinate and subordinate one-the-job raters, and the Nurse Opinion Inventory. The comparison was made to determine whether the two groups were initially the same and then to determine whether they became different.

Description of the Continuing Education Program—the Experimental Variable. Eight universities offered a series of programs over a 2-year period. Through central planning by the Continuing Education Seminar of the Western Council for Higher Education in Nursing, all of the programs were highly similar in content. This research study represents a pooling of the eight programs and their participants into a single program and group.

Assumptions. Effective nurse leaders tend to create a climate in which high quality nursing care is provided. To be effective a nurse leader must have ability in three basic areas: • technical knowledge of modern nursing practices; • administrative ability in organizing tasks, implementing team work, and working effectively with people; and • knowledge of ones' self, one's personal needs and defenses, and one's impact on others.

Hypotheses. (a) There is a positive relationship between more democratic, understanding, attitudes and desired behavior in the situational exercise and on the job.

(b) Changes (differences from one occasion to the next) in attitudes are reflected by corresponding changes in behavior.

(c) Changes in the participants (the experimental group) are greater than changes in the nonparticipants (the control group) and are in the direction of • more democratic attitudes, increased empathy with patients and personnel, • increased capabilities in decision-making, • increased length of time spent with patients, and • improved interpersonal relations with patients and coworkers.

Findings.—

- Comparison of Experimental and Control Group Subjects on Situational Exercise Variables and On-the-Job Ratings. There was only one significant difference in change between the experimental and control groups for the patient-observer scores that pertained to the comments-by-rater variables. On the variables associated with Observer Number One, the total nonverbal behavior and total score showed significant differences in change favoring the experimental group. Only one variable for Observer Number Two showed significant change (measuring the degree to which the patient was encouraged to talk favoring the experimental group). Significant changes were found for the superordinate rating—favoring the experimental group. There was no significant difference in change for subordinate ratings.
- Comparison of Experimental and Control Group Subjects on Nurse Opinion Inventory. Although no explicit test of significance of change was made on this variable, it is felt that there was a significant change on the part of the experimental subjects in the direction of answering the questions with more democratic attitudes.
- Comparison of Experimental and Control Groups on the Todd Tests. Using the chi-square test of differences, the results showed that the experimental subjects were significantly higher than the control group subjects by approximately three points.
- Correlation among Variables for Experimental and Control Groups. Correlations among the 81 variables for the experimental and control groups are presented. Patterns of correlations among the 81 variables were highly similar for both experimental and control groups. Exceptions include a weak but positive relationship ($r = .20$) for persons in more specialized positions to obtain higher democratic attitudes scores on the Nurse Opinion Inventory. A scaled measure of educational background showed a weak but positive relationship with the ratings of the nurse's ability to communicate understanding and to demonstrate friendliness in the situational exercise. Correlations between ratings given by superordinate and subordinate raters of a subject's on-the-job performance were generally weak ($r = .20$ or less). The correlations between measures of the situational exercise and ratings of superordinate and subordinates of a subject's on-the-job performance were generally zero order. Scores on the Nurse Opinion Inventory for the control group showed a moderate correlation ($r = .40$).
- Analysis of the Relationship of the Biographical Inventory to the situational exercise and on-the-job performance variables. No significant multiple correlations were found between the factors of the biographical inventory and the variables of the situational exercise or the ratings obtained from superordinate, or subordinates of on-the-job performance.
- Multiple Correlation Analysis of the Relationship of the Minimum Satisfactory Achievement and Self-Description Scales and the Variables of the Situational Exercise and the Ratings of On-The-Job Performance. No significant correlations or multiple correlations were found between the Minimum Satisfactory Achievement Scale and The Nurse Self-Description Inventory and the situational exercise and on-the-job performance ratings.

Conclusions.—The continuing education program had a definite impact upon the participants' expressed attitudes and beliefs concerning leadership roles and interpersonal relations. Significant differences on the Nurse Opinion Inventory and the Todd were found. However, the Nurse Opinion Inventory had no significant correlations with any of the behavioral measures. The comparison of the experimental group with the control subjects showed a few significant differences between them clearly attributable to participation in the program as measured by the situational exercise and on-the-job performance.

The program's value is evidenced by administrators' continued support and the staff's belief in the program as a major tool in promoting more effective leadership.

Critique

The need for leadership skills in nursing has been firmly established. This research study attempts to determine the effectiveness of one educational leadership program that was carried out in 12 Western States, by eight Western universities, and was financed by the USPHS. The leadership program is described and rationale for its implementation outlined. Though the content of the program implemented in the various hospitals is considered to be similar, time sequences and methods of presentation varied among hospitals. The variations would in some degree affect the results of this study. The program was directed by a highly qualified administrative staff. The objective of the leadership program was to aid participants in becoming more effective leaders, thereby improving patient care. Ability requirements for a nurse leader are defined as technical knowledge of modern nursing practices; administrative ability in organizing tasks; implementing teamwork and working effectively with people; and knowledge of one's self, one's personal needs and defenses, and one's impact on others.

Theoretical framework of the study is developed. Rationale for the study is presented and a good literature review included.

The methodology is described. Two of eight instruments used in the study were developed by the Regional Leadership Conference Staff and include • a situational exercise with three observer scales of nonverbal behavior, verbal behavior and patient observer, and • a rating form designed to determine staff acceptance of decisions, interpersonal relations, and decision making skills. The remainder of the instruments were borrowed from various authors: Nahm, the Nurse Opinion Inventory; Todd, two Nursing Relationship Lists; Mulaik and Mulaik, Calvin Taylor, Nurse's Self-Description Form; and Calvin Taylor and Robert Edison's Registered Nurse Satisfactory Achievement Scale. Procedures used in the development of the tools are lacking, which leaves some question as to their validity and reliability. Those that have been built by others are only briefly described.

The measurement of attitudes carries with it a number of confounding variables that create difficulty in measurement and lead to inconsistencies in responses. Included are subjectivity in ratings, inconsistencies in interpretations of behavior by observers, and differences in connotations placed on foils or descriptive terms used in ratings. One would question the use of a play acting situation in the study of nurses' behavior if a true picture of the nurses' behavior is to be determined and if it would be further complicated by the presence of observers.

The sample is large: 410 experimental subjects and 450 control subjects. These were compared on 81 variables and were found to be highly similar. A great deal of time and effort were expended in equating the groups. One would question whether or not before and after testing of the experimental group might not have been a more appropriate method.

This study presents an innovative approach in the assessment of the effectiveness of a leadership program and carries with it many of the pitfalls encountered in the study of attitudes. This is recognized by the authors in some degree. This study should be of interest to persons studying the assessment of attitudes or the assessment of educational leadership programs, but because of deficiencies in reporting and questionable validity, it does not contribute greatly to nursing research design or to knowledge about nurse staffing.

A32. Jaco, E. Gartly. "Evaluation of Nursing and Patient Care in a Circular and Rectangular Hospital Unit." Final Report, prepared for the Hill Family Foundation, St. Luke's Hospital, St. Paul, Minnesota, June 9, 1967.

Review

Purpose.—(a) To determine if patient care, efficiency of personnel and reduced costs can be improved by physical design of hospitals; (b) to evaluate the effectiveness of the circular unit for different levels of patient care; (c) to replicate the study of M. Sturdavant, "Comparisons of Intensive Nursing Service in a Circular and Rectangular Unit," and (d) to examine other variables involved with divergent levels of patient care in a circular type unit.

Method.—Independent variables are the circular or radial shaped and rectangular or angular shaped nursing unit. Dependent variables are • nursing care (type, level, and amount); • nurses' utilization of the unit; • patient welfare; • patient satisfaction and reactions; • nursing staff satisfaction and reactions; • physician satisfaction and reactions; • length of stay; and • cost of patient care.

Nursing and patient care for patients receiving intermediate care are compared in the circular and angular units. Intensive patient care and intermediate patient care are compared in the circular unit, and self care is compared in the circular and angular unit. Level of occupancy and divergent quantitative and qualitative staffing patterns are studied. Patient population was randomized to control intervening factors. Basic research was designed to determine significant differences in dependent variables in the two type nursing units and, also, in terms of intervening variables for intensive, medium, and self-care patients.

Hypotheses.—The major hypotheses state that the following variables will differ in the angular nursing unit as compared to the circular unit: • type of care, • level of care, • amount of nursing care, • patient satisfaction with nursing care received (hospital experience will differ between patients receiving varying levels of care), • utilization of nursing staff and efficient use as related to patient care, • patient welfare, • overall nursing staff satisfaction, • overall physician satisfaction, • length of patient stay, and • cost of hospital care.

The study hospital, with six modern nursing units of 118 beds, was constructed prior to this project. A newly constructed angular unit served as the control unit. Three advisory committees, administrative, technical and hospital, play an important part in the execution of the study.

Method for medical and surgical care.—Specific procedures used and details on the definitions and measurement of research factors were presented in an earlier report. The following summary was provided. Twelve study situations were set up in circular and angular units. Occupancy levels altered from 90 percent filled or more to low 50 percent filled or less. Nurse staffing patterns were varied quantitatively from high, average, to low amounts and also qualitativley by varying the ratio of the highest skill level of registered nurses. Licensed practical nurses and nurse aides were included in the total staff. Observations were made of total staff for a 5-day week, 24 hours per day, by observers trained in work sampling methods. One week resettling period occurred between each study situation to blur experimental halo effects.

Each unit was composed of 22 beds housed in two private rooms and six semiprivate rooms. General medical and surgical patients needing care who were not emergency admissions, who were not employees of the study hospital, and who had never been admitted to a radial type of unit, are included in the study. Identical nursing staff was attempted in both type units, so that each nurse was her own control for individual differences. Nurse staff turnover altered the plan. Nurse staff was interviewed at the end of each study situation. Physicians who had admitted patients to study units were interviewed at midpoint of the study and again at the end. Nursing staffs completed research forms daily. Patients were privately interviewed just prior to discharge. A clerk recorded trips to patients' rooms and information on other variables studied and, in this way, supplemented the observations of the observer staff.

Method for intensive and self-care.—Intensive care was studied for a 1-month period in the circular unit. For the angular type, a study unit was not available.

The nursing staff assigned to the existing angular self-care unit was transferred to a similarily arranged circular unit. They worked for a 1-month period on each unit to provide comparison to self care on the two types of units.

Major results and conclusions.—

1. *General medical and surgical care.* (Intermediate—general differences between the two units when intervening factors are ignored.)

- Type of care.

Studies of intensive, intermediate and minimal care provided an opportunity to examine some of the differences in progressive patient care. From the study of intermediate, medical and surgical care, general differences in types of nursing care provided when intervening factors are ignored are shown in table 1. The categories used to describe nursing activities are similar to those used in the Rochester study. These are direct care, indirect care, general assistance, standby time, and travel. The results of the 12 study situations, grouped as a whole, are derived from 200,000 observations made on both shaped units, over the time span of a year, each with identical nursing staffs. This variable of difference in care was measured by (a) major types of care, (b) ratio of direct care to other types of care, and (c) ratio of patient involved care to nonpatient involved care.

Findings support the first hypothesis that type of nursing care will differ on the two units.

Proportion of direct care is shown as divided into (a) medical, measured by frequency of tests, treatments, etc.; (b) physical, measured by frequency of supportive care; and (c) measured by frequency of communication. This proportion is based on observation of all functional categories. When percentages are based on direct care only the results differ. The authors propose that the second method of determining proportionality is considered the most sensitive. Both support the major hypothesis.

- Level of nursing care.

Level of nursing care is measured by the proportions of patient care provided by the head nurse and registered nurses to that provided by licensed practical nurses and nurse aides in terms of direct care to other types of care, and patient involved to nonpatient involved care on the two units, showing major types of patient care by head and charge nurses on a circular and an angular unit; major types of care by licensed practical nurses on a circular and an angular type unit; and major types of care by nurse aides in a circular and an angular nursing unit.

The different categories of nursing personnel perform divergent functions and activities of patient care separately on the two shaped units and together on both units. The level of patient care in terms of training and experience of the performer and the shape of the unit in which the patient found himself was a factor to investigate. A slightly higher level of patient care was shown to be provided by the nursing staff on circular than on angular units.

In eight levels of patient care in a circular and an angular unit, categories of care were provided by higher trained levels of personnel on the circular unit than on the angular unit. It was felt that differences could be chance observations. Evidence is weak in supporting the second major hypothesis that types of nursing care differ between the two shaped units.

- Amount of nursing care.

Amount of patient care was measured by numbers of trips by nursing staff to the patients' rooms in the two units and, specifically, when trips are initiated by patients' calls. The factor was observed only on the day shift, 7 a.m. to 3 p.m. Trips categorized into (a) those initiated by the nurse, (b) those initiated by patients, (c) those made in patients' absence, and (d) those involving patients and staff to staff room trips.

Ratios indicate that patients on circular units received a higher amount of nursing care than those on anular units. This supports the third major hypothesis—that amounts of care would differ.

- Utilization of nurses by unit.

Utilization of nurses is measured by the proportion of time nurses were observed in patients' rooms on the unit to other areas of the unit, and the proportion of time nurses were observed in unit but out of patients' rooms. An efficiency index comprised of three ratios: (a) ratio of time nurse was observed in patients' rooms when patient is present to times she was in the rooms when patient is absent; (b) ratio of times nurse was observed in the corridor of the unit to other unit areas; and (c) ratio of times she was observed performing professional nursing services in patients' rooms to the time used for personal use, and time out, when the room is unoccupied by patients.

- Patient welfare.

Patient welfare was measured by three major scales developed by Aydelotte, et al; *An Investigation of the Relationship Between Nursing Activity and Patient Welfare*, University of Iowa, 1960. These three scales are Mental Attitude, Physical Independence, and Mobility, based on daily ratings of patients by nursing staff in charge. Scale scores were averaged for patients each day and were averaged for the entire study situation.

No differences were found in patient welfare for patients hospitalized on the two types of units.

Consequently, the fifth major hypothesis cannot be supported, that differences in patient welfare would be found between the two types of units.

- Patient satisfaction.

To measure patient satisfaction, questions were asked patients about the two types of units that were also used in the Rochester study. Other questions were added to the interview that might reveal how patients feel about the nursing service and various physical and nonphysical features of their units and rooms. The most significant question asked: "Was there anything about the room or unit that they particularly liked?" More items in the rooms than items in the units were mentioned. Patients on the circular units reported more features in rooms and units than did patients on the angular units. The rooms on both type units were similar in design, newness, etc. Patients seemed to have far more favorable feelings and preference for the circular than for the angular type unit.

Patients were asked to rate nursing service in terms of poor, fair, good, very good, and excellent. A higher percentage of patients gave poor and positive ratings on the circular unit; however, a higher percentage on the angular unit refused to answer.

When asked if they were bothered by activity outside their rooms, only 3 percent on the circular unit reported being bothered, while 14 percent on the angular unit reported annoyance by activity.

Eleven percent of patients reported dissatisfaction with privacy on the circular unit; only 5 percent reported such on the angular unit. Satisfaction with the environmental factors of the units were slightly higher on the circular unit. Eighty percent of the patients on the circular unit felt the unit had improved their morale as compared to 78 percent on the angular unit.

Patients were asked to evaluate room charges. Thirty-eight percent on the circular unit felt the charges were too high as compared to 33 percent on the angular unit.

The major hypothesis is supported in part regarding patient satisfaction between the two units.

- Nursing staff satisfaction.

Nursing staff satisfaction was determined after each study situation. The higher nursing staff levels preferred the circular unit; lower staff levels preferred the angular type. Totally, nursing personnel preferred the circular type unit.

The percentage favoring the circular to the angular type unit was highest where efficiency and convenience were concerned. No particular preference was shown where interpersonal relationships and patient care were involved.

- Physicians' satisfaction.

To determine physician satisfaction, a sample of physicians who had attended patients on both type units was interviewed. All physicians were seen by the interviewer who also had interviewed patients and nurses. Physicians preferred circular type units for convenience and for improvement in nursing care. The angular unit was preferred for patients wanting or needing a private room, for the emotionally disturbed, the senile, intolerant complainers, and the terminally ill. The physicians believed that the circular units did not provide enough privacy. However, physicians favored the circular units in relation to patient progress, patient morale, nursing care, and convenience of the medical staff. The major hypothesis was supported in that differences in satisfaction and preferences would occur between the two units.

- Length of stay.

Average length of stay in the two type units was about the same. The major hypothesis was not supported.

- Cost of hospital care.

A 4-month period, October 1, 1966, to January 31, 1967, was selected to study cost of hospital care and average patient charges per day of stay. The major hypothesis was supported. Costs to the hospital favored the circular type unit, but cost differentials were not reflected in the average per diem charges to the patients. Cost accounting and per diem per bed costs used to determine charges were felt to be "inexact sciences," but the above conclusions were obtained from them.

2. *Comparisons of a circular and an angular unit at varying occupancy levels and nurse staffing patterns.*

The comparison of a circular and an angular unit at varying occupancy levels is shown in the second part of the report. Twelve study situations were devised for circular and angular nursing units giving intermediate care to general medical and surgical patients. Occupancy levels were altered quantitatively and qualitatively. Specific definitions of high and low occupancy and composition of nurse staffing patterns were presented in an earlier report and not included in this summary. Studies of average staffing, low staffing and high staffing are presented as quantitative alterations, and high proportions of registered nurses, of licensed practical nurses and of nurse aides as qualitative variations in nursing personnel.

The major dependent factors studied when the nurse unit is varied by level of occupancy and nurse staffing patterns are (a) type of nursing care, (b) level of nursing care, (c) amount of nursing care, and (d) utilization of the unit by nursing personnel in terms of specific location on the unit observed during the study situation.

Method.—Each study situation continued for a period of 4 consecutive weeks. The nursing staff was observed for the 5-day workweek, 24 hours a day. Following each study situation, a 1-week "resettling" period in which the unit returned to normal staffing operations helped to avoid potential experimental contamination and allow the nursing staff to prepare the new, upcoming study situation. The 12 study situations in which occupancy was varied from high to low for six qualitative and quantitative changes in nurse staff patterns were first initiated on the circular study unit. Then the nursing staff was moved to the angular study unit, which had to be renovated to make it reasonably similar in space, room accommodation, etc., to the circular unit.

Results.—Not all implications of varied staffing patterns and occupancy levels are involved in the summary. The major activities observed on the circular type unit and the angular type unit, during the 12 study situations are • more direct care than direct care, • more time out and off the unit, • higher level of nursing care provided by higher level staff, • more patient involved than patient uninvolved care, • usually more efficient use of the unit, • more general assistance, • less direct patient care, • less communication with patients, • less use of corridors, • less use of nurse conference room, • usually less patient uninvolved travel, • less use of lesser trained nursing personnel, • more appropriate performance of nursing care functions, and • more nursing staff flexibility in adapting to change in patient population.

3. *Part IV of the summary was devoted to an evaluation of intensive care and self-care units with particular reference to their implications for progressive patient care in the acute general hospital.*

Intensive care units. A plan to compare intensive patient care in both the circular and angular type units was only partially carried out since intensive care admissions are not elective and experimental control of occupancy level was impossible. Only one intensive care unit was available. The nursing staff of the intensive care unit was observed at two different periods for 2 weeks each to study occupancy at two different levels. Differences in occupancy did not occur. Observations were recorded for average occupancy at normal staffing for the intensive care unit.

An angular intensive care unit was not available. Deficiencies in funds and staff prevented having one set up. Observations compiled on the intensive care unit provided the opportunity to compare intensive patient care on the circular unit with intermediate care on the circular unit and provide choices to some dimensions of difference between the functioning of intensive and intermediate care in the same kind of unit.

Method.—Nurses' utilization of the two units for different levels of care was determined by observations. Total nursing staff was observed more in nurses' stations and rooms when patients were present and more in utility rooms, miscellaneous areas of the unit, and professional activity in unassigned patients' rooms; less in the medication area, corridor, tub and shower room, nurses' conference room, and no difference between units in patients' rooms with patients absent. Of the 12 possible areas of the unit observed, the use of such areas by the two nursing staffs differed in 10 (83 percent) suggesting that the two levels of patient care in identically shaped units varied enormously.

Results.—The intensive care unit when compared to intermediate care at low occupancy was found to provide significantly more direct care, indirect care and standby, less general assistance time and travel. Intensive care differed considerably from intermediate care but even more so when the latter was at low occupancy. Travel was less in intensive care; more direct care was provided. Standby and travel were related on the intensive care unit. Intensive care unit takes the form of standby since there was not the constant travel during the regular work day for the nursing staff.

Minimal or self-care unit evaluation. Minimal or self-care was studied. The study hospital had an operating angular shape self-care unit. A 4-week period of observing the self-care was set up on the regular angular self-care unit and later relocated into a circular unit, renovated and furnished with similar fittings to those of the circular unit, previously observed for intermediate and intensive care. Patients and a very small nursing staff were observed for a 4 week period; admissions could not be controlled.

More direct care and time out, less travel and no differences in indirect care, general assistance and standby were noted in the circular unit.

A study of types of nursing care showed that significantly less travel was required by head nurse and registered nurse on the circular self-care unit than the angular one. Nurse aides exhibited the most differences in patient care on the circular unit. Nurse aides showed more time in direct care, less in travel, the same in general assistance and standby than on the angular unit, indicating that lesser trained personnel did more direct care where high visual contact existed. The total staff on the circular unit exhibited more social direct care, less in clean up, clerical functions, medical, physical, communications with visitors and other routine functions. It was assumed that the visual contact provided on the circular self-care unit encouraged more verbal communication than was observed on the angular unit. This was a striking contrast to the circular intermediate care unit where social direct care was rarely seen.

In a separate analysis of more specific functions of nursing care for head nurses, registered nurses, and nurse aides between the two shaped units, no differences were found in specific, functional categories for head nurse and registered nurses but significant differences for aides who spent more time in social direct care and extra-unit activities, less in clean up and clerical duties.

Self-care patients were observed to determine their use of the unit and whether the shape of the unit affected their behavior. Trip tickets were filled out by patients at the end of each day recording areas visited. Accuracy was checked by having the patients place call board tags by their names when leaving the unit. Differences in the use of the two units were determined by research observers who recorded the location of patients on the two type units, 24 hours a day for 7 days.

A correlation of ($r_2=452$) existed in the frequency patients on the two shaped units reported their visits. Rank order of popularity of 19 areas was tested. Major activities of self-care patients were found to be meals, tests, therapy and leisure time. Both staff and patients favored the circular type unit, staff somewhat more so than patients.

Progressive patient care in circular and angular hospital nursing units. An analysis was done on levels of progressive patient care in circular and angular hospital units, in terms of physical design, for previously studied categories of care: intensive, intermediate, minimal, and self-care. These are studied to determine potential effects of the shape of the unit on provision of such care. Information was obtained from the previous findings of the study. Methods of analysis are not discussed.

Levels of progressive patient care were found to vary considerably on similarly designed units, supporting the concept that "levels of patient care comprise distinct and separate universes of hospital care." Utilization of the same circular shaped unit by personnel for the three levels of progressive patient care was also found to be divergent. An analysis is made of the three levels of care on the angular unit contrasted to the circular unit. It was found that the shape of the unit affects major aspects of nursing care at all levels of progressive patient care.

Physicians' opinions in relation to patient care and physical design showed that they tended to favor the circular type unit increasingly as the need for intensive care increased and favored it less as the level of care decreased from the intensive care unit to self-care.

General conclusions.—It was concluded that circular type units have advantages and disadvantages for overall patient care in terms utilized by staffing patterns.

In a situation of high occupancy and low staffing, the circular unit has many advantages in providing total patient care and shows promise for flexibility in providing various types and levels of nursing. Different demands were shown to be placed on the staff and patients in the circular unit from those in the angular unit. The circular design was more convenient for nursing staff and physicians but more detrimental to the morale of the nursing staff.

Licensed practical nurses and nurse aides, who felt they were permitted to perform at a higher level on the angular unit and could function with less supervision, therefore tend to favor that type of unit. The angular type accommodated all types of patients in contrast to the circular type that is favored less as level of care decreases. Low occupancy levels on the circular unit disrupted the operation of the unit (with a typical nurse staffing pattern) but improved the efficiency of the angular unit. High occupancy was shown to improve the efficiency of the circular unit but not always of the angular unit. Nurse staffing patterns were found to affect the efficient and effective use of the circular unit as much as or more than the angular unit, especially for the lesser trained personnel. It was felt that the circular type has unexplored possibilities for self-care in the acute hospital. Many intervening factors prevent automatic improvement of patient care by physical design. It depends upon how the physical features are mobilized, utilized, and managed. Hospital costs were shown to be less in the operation of the 24-bed circular unit studied than of the angular unit, but if a study of a larger unit was to be done, Jaco thought it would show quite different results. He believed that quality of nursing care would need to be studied before cost. It was felt that the problem of hospital cost of patient care could be relieved by hospital design without impairing and possibly with improving the quality of care, but it would depend on how the unit is utilized socially, psychologically, medically, and administratively.

Recommendations.—

- Explore better utilization of present nurse staffing patterns in units when occupancy levels and types of patients fluctuate.
- Explore analysis methods for the improvement of admitting procedures so that patients can be given circular or angular accommodations to their satisfaction.
- Evaluate hospital nursing personnel in light of whether they perform best on the circular or angular unit.
- Explore, quantitatively and qualitatively, use of nursing staff when the two type units are on the same floor adjacent to each other.
- Explore and develop the circular units for use of the self-care patients and their needs so that the circular units will be acceptable to the medical staff for the self-care patient.
- Establish a Department of Administrative Research and Planning or Patient Care Research to develop and evaluate projects of significance to hospital administration and management.

Critique

In light of the nurse staffing shortage and rising costs, hospital architectural design is a major subject for study as a partial answer to these problems. The broad areas necessarily encompassed by such a study involves the assessment of many variables that Jaco has included in his investigation. The independent variables, the circular and rectangular type nursing units, are compared. The dependent variables studied are nursing care, type, level and amount; nurse utilization; patient welfare, satisfactions, and reactions; nursing staff satisfactions and reactions; physician satisfactions and reactions; length of hospital patient stay; and cost of patient care. Variables are studied at high and low levels of occupancy with divergent quantitative and qualitative staffing patterns. Studies of medical-surgical care, intensive care, and self-care units are included. An effort was made to control other intervening factors through randomization of patient populations. Jaco does not seem certain that this was accomplished.

Jaco's study, insofar as possible, is a replication of the M. Sturdavant, Rochester, study. It is unfortunate that only the final report of this research project is available and that specific information as to the development of theoretical framework and use of the several methodologies and tools employed is deficient, so that proper assessment of this study cannot be made.

This appears to be a comprehensive study using three very able committees for consultation. The sample appears to be adequate.

The value of this study lies in the approach that was taken in the study of a problem that encompasses the many variables that must be considered. The findings do indicate the values and deficiencies of the two types of hospital design.

This study should prove useful and interesting to anyone concerned with hospital design or its study or those who are predicting staffing requirements for units with a specific type of design.

A33. **Jacobs, Stanley E.; Patchin, Naomi; and Anderson, Glen L. *American Hospital Association Nursing Activity Study Project Report.* USPHS Contract No. PH 110–235, U.S. Department of Health, Education, and Welfare (no date).**

Review

Purpose.—"To gather and analyze data in order to determine whether there is a difference in the amount of basic nursing care received by patients 65 years of age and over as compared to younger patients in adult medical and/or surgical units and, if so, to determine cost implication."

Method.—Study results are reported for 54 hospitals that were located in metropolitan areas with five to seven hospitals in each area or region. The net effect of voided data is that complete data were gathered for approximately 52 hospitals.

The study was conducted in 154 nursing units. The number of units studied varied between hospitals. (The number of units studied in a certain number of hospitals is presented.) The units studied varied in size from 11 beds to over 60.

Work sampling was conducted in hospitals for from 7 to 12 days.

The total number of equivalent patient days is 43,213.23. The total nursing staff hours during the course of study for all hospitals in the units under study was 182,799.25. The total number of valid work sampling observations for all hospitals was 234,985. Variation in each hospital is described and explained.

Work sampling was the basic technique employed in this study. Work sampling observations were procured to furnish primary information in the relative amount of nursing staff time allocated, by staff type, to specific activity categories and to beneficiary patient groups.

All nursing personnel directly assigned to the nursing units under study were observed.

In collecting work sampling observations, one observer was utilized for each of the three shifts in a day. Throughout a shift, the observer made a series of rounds through the nuring units. During each visit to a unit, one instantaneous observation was made on each nursing staff member assigned to the unit on a first-in-view, first-observed basis. Each observation consists of four recorded items of data including time of observation, the staff member observed, the type of activity, and the patient beneficiary. The time at which a round began was used as the time of observation for all observations on that round.

A body of patient information was obtained to further describe patient beneficiary. Patient information includes age, sex, medical condition (critical or not critical), pre-op status, etc. ("All but three of these items constitute criterion variables to some degree.")

At the onset of the study, each hospital was asked to derive three parameters of its patient population including average length of stay for group under 65 and for group over 65 and the percentage of discharges representing patients in the older group. These parameters were later used to compute the total number of observations to be made.

Data collection was accomplished with local personnel who were trained under the supervision of AHA staff. In most regions, a nurse assisted in training the work sampling observers. Each participating hospital furnished its own personnel to function as work sampling observers. Census recorders were usually ward clerks. Each hospital appointed a nurse to act as coordinator who was to help select sampling observers, develop a schedule, brief the personnel, account for personnel being absent from unit, and observe work sampling. Each hospital also appointed a representative of administration to act as coordinator in order to secure preliminary data as basis for number of observations, to train the census recorders to review the daily observations, and to forward recorded data. Training sessions were held for hospital coordinators and sampling observers. All data were reviewed manually by the project staff for completeness and general accuracy and certain computer edits were performed.

Special consideration was given to inconsistencies in sampling observations so that some data were voided. Other data discontinuities resulted from lack of relief personnel for observers. Certain situation observations were legitimately recorded for patients not present on the unit. Also there was some confusion regarding the "head nurse" and "nurse in charge" differentiation.

Findings.—

- Staff Hours Per Patient. The ratio, staff hours per patient, is either on a per shift or per day basis.

The ratio is obtained by dividing total working hours of all nursing service personnel assigned to a unit per day or per shift by the equivalent number of patients in the unit. The mean value is computed to procure an average for several hospitals. To measure nursing care provided a certain subgroup, staff time is multiplied by the number of observations pertaining to the subgroup and the result is divided by the total number of observations. The nursing care ratio is computed by dividing the staff time related to the subgroup by the equivalent patient in that subgroup.

The mean hours of care per patient day was 4.39 hours. The ratios per shift are presented as well as the variation between hospitals.

When student nurses, volunteers, and other nonsalaried personnel were eliminated, the average hours per patient day for the 50 hospitals is 4.05 hours.

A breakdown of hours per patient per day by region is presented.

The mean hours of nursing care per patient by shift for hospitals grouped by university status are presented.

Various individual characteristics of the hospital were assigned weights to provide an index of effort specialization. Characteristics of effort specialization include: the existence of a recovery room, inhalation therapy, intravenous therapy team, centralized orderly pool, nurses delivering or picking up diet trays, delivering or picking up special diet trays, cleaning rooms, and transporting patients. The difference in nursing hours of care per patient is not statistically significant between hospitals falling into each of the three effort specialization categories.

There appears to be little or no difference in mean hours of care per patient between hospitals that participate in the HAS program and those that do not.

- Nursing Staff Categories of Personnel. A table shows the number of hospitals utilizing each category of nursing staff personnel. Nursing staff personnel is divided according to the following designations: head nurse, registered nurse, licensed practical nurse, nurse aide, orderly, ward clerk, student nurse, volunteer, other salaried, and other unsalaried.

The largest percentage of care for all hospitals combined was provided by nurse aides, closely followed by registered nurses.

The proportion of nursing time spent in the nursing activity categories as defined in this study is presented.

- Patient By Age Groupings. Age groupings consist of 0–14, 15–24, 25–44, 45–64, 65–74, 75+. The number of equivalent patient days and percentages based on these age groupings are presented.

Overall percentage of patients 65 years of age and older was 36 percent. The percentage varied widely between hospitals.

- Patient Care Received by Groupings of Patients. The percentage of observations not assigned to specific patients was within reason for 45 of the 50 hospitals with complete data. The percentage was quite low for one hospital and quite high for four hospitals. There was consistency between day and evening shifts. The variation was not a function of staff to patient ratio.

For each shift, the analysis of variance statistical tests rejects the hypothesis that there is no difference in care received by age groupings of patients at better than .001 level of confidence. The over 65 age group receives significantly more care than does the 65 to 74 year age group.

Adult surgical and adult medical patients receive about the same amount of care per patient.

- Wage and Salary Information. For all categories of staff, the high region mean is about 50 percent higher than the low region mean.

For each of the 50 hospitals with complete data, the total dollar increment of cost for care of Medicare-age patients over and above other adult medical/surgical patients for nursing unit staff salaries is between $1,400,000 and $950,000.

Conclusions.—

1. Major findings based on the analysis of study data.

- The mean hours of care per patient provided by staff assigned to the nursing units under study were 4.39 hours per day. (Range—3.06 to 6.28).
- Differences in hours of care per patient by nursing unit staff were very small and not statistically significant between hospitals grouped by the following characteristics: hopsitals under and over 300 beds; university or university affiliated hospitals and other; hospitals that had a high degree

of effort specialization and other; hospitals that participated in HAS and other.

- The overall percentage of staff hours provided by professional nurses was 33 percent. (Range—23 to 47 percent.)
- Comparison of activities of various staff categories revealed certain relationships in activity patterns.
- The overall percentage of patients age 65 and over was 56 percent. (Range—12.4 to 63.6 percent.)
- There is little or no difference in hours of care per patient between patients in the two sex groups.
- An analysis of hours of nursing care per patient by age group revealed very little difference up to age 55.
- A second analysis by age group revealed that care received by older age groups exceeded that received by patients under age 65 by 21 to 31 minutes per day for the age 65 to 74 group, and 55 to 79 minutes per day for the age 75 and over group.
- The amount of care per patient provided by registered nurses and licensed practical nurses, aides, and orderlies increased significantly from the under age 65 group to the over age 65 group.
- There was considerable variation between hospitals in relative amounts of care provided under and over age 65 patient groups.
- Analysis of nursing care provided by medical versus surgical units indicates that the relative amount of additional care for the elderly patients was about the same in both types of units.
- There was a large variation between regions and still larger variation between hospitals in pay rates for like categories of staff.
- The annual additional cost of nursing care provided the patients age 65 and over was based on salary levels and the patient mix at the time of the study. The findings for 40 hospitals were extrapolated to 1,776 hospitals resulting in $30,000,000 ± $10,000,000 more annually for the costs of nursing care provided patients age 65 and over.

2. Member hospitals are generally willing to participate in research projects.
3. Valid and usable industrial engineering data can be procured in hospitals by their employees, provided the training of employees is adequate and on-the-spot guidance is provided.
4. The study methodology employed in this project was basically sound to yield findings from which one may generalize when data from all the hospitals are used.
5. The scope of a study within a single hospital would have to be radically increased to yield results in which one could have statistical and even pragmatic confidence.

Critique

This is a well known study and a highly relevant one. A major article has appeared in *Hospitals*, and since it deals with a question of significance, attention has been given to its findings. The cost of caring for the over 65 years of age patient has served as a topic of argument between third party payers and hospital administrators, many of whom assert that the Medicare apportionment formula has been inequitable.

The study is based upon the need for an analysis of how to measure the cost of care provided the Medicare patient. No other framework is provided for the study, such as that which might be drawn from the literature dealing with the characteristics of the aged. Reference was made and recognition given to previous work carried out by Connor, CASH, and the methodology developed by USPHS.

The sampling procedure is described in detail and attempts were made to secure a broadly representative sample of hospitals throughout the United States. Recognition was given to the fact that some unavoidable bias has been built into the sampling. The explanation for the bias is logically presented.

The study utilized the work sampling methodology proposed by USPHS (in booklet) and gives evidence of its feasibility. Questions can be raised about the reliability of the data derived from the work sampling, however. No tests of observer agreement during the sampling itself are reported. The training program was standard and tests for observer agreement were done during the training program only.

Care was taken to depict the data accurately, to obtain a large mass of data, and to analyze it appropriately. Findings are based upon the data. The appendices are developed in great detail, describing the procedure for data collection, the nature of the data, the formulae used in its analyses, and how the data have been stored for retrieval.

This study provides information about the staffing of the hospitals and the differences in staffing among the sample hospitals. The diversity in patterns is not marked. This finding in itself is worthwhile since it indicates that staffing practices tend to be more alike than different. Therefore, to change patterns of staffing practices by the introduction of new models or guidelines entails changes in the perception of staffing guides in a large number of hospitals.

A34. Jelinek, Richard C.; Munson, Fred; and Smith, Robert L. *SUM (Service Unit Management): An Organizational Approach to Improved Patient Care.* A Study Report for the W. K. Kellogg Foundation, 400 North Avenue, Battle Creek, Michigan, February 1971.

Review

Purpose.—This report is an appraisal of the SUM concept. (SUM is also referred to as Service Unit Management or Ward Management.) Emphasis is on the evaluation of the problems in implementing and operating a service unit management program.

Approach.—A national questionnaire survey was used to identify hospitals with SUM and the characteristics of the units involved. Eight selected hospitals were studied so there could be a comparability of performance between those with and without SUM.

Sample.—Fifty-five patient units were investigated in the eight hospitals located in Michigan, Ohio, Illinois, and Massachusetts. Only medical, surgical, and medical-surgical units were included in the study. Hospitals that had SUM throughout, hospitals with SUM on some units and not on others, and hospitals that did not have SUM on any of their units were among the eight hospitals in the sample.

In each study unit, data were collected for measurement in the following areas: personnel costs, quality of care, patient workload, personnel satisfaction, organizational tension and management style, personnel acceptance of SUM, assignment of responsibility for activities between nursing, SUM, and other departments, and type of SUM organization.

The presentation of this report consists of the author's explanation of why SUM should be considered, the kind of SUM that exists, and management of change.

The rationale basic to the consideration of SUM necessitates a consideration of cost and quality factors. The implementation of the SUM concept reduces cost, improves quality of care, and saves professional nursing time; therefore, it reduces the nursing shortage, increases personnel satisfaction, and sets the stage for further improvement.

"Quality" was measured in this study through the use of a quality index based on sample observations directed toward measuring the presence or absence of certain attributes associated with the quality of care. (*Quality Sampling Instruments.* Bureau of Hospital Administration, The University of Michigan, Ann Arbor, 1968.) Expert judgment by professional nurses who observed patient care and statements reflecting the perceptions of nurses working on patient units were also used to measure quality. Cost included the personnel hour per patient day. A chart depicts the "cost-quality" relationship.

The evidence to support the belief that SUM will reduce costs is based on the work sampling study which showed that the professional staff on SUM units spent less time in unit-centered activities, personnel activities, and indirect patient care activities. There were increases in direct patient care activities and standby time. Interview data supported the fact that the introduction of SUM was not accompanied by effective reorientation of the professional nurse. The shift in amount of time spent in direct patient care for all professionals was 26 percent in non-SUM and 28.5 percent in SUM. For the head nurse, the shift was from 11.9 percent to 18.2 percent. Although the hospitals that introduced SUM increased their cost on a per patient basis under SUM, the level of the service (measured in quality of patient care) increased. This increase in quality is greater than it would be if staff were simply increased.

The difference in quality was observed in the response of all three techniques used to measure quality: the quality index, the expert judgment of professional nurses, and perception of the nurses on the units. The quality measures were scored on a 100 point scale. Three quality sub-indexes of each quality technique were compared. The quality of nursing tasks increased 4.28 and 8.47 for nonnursing tasks. The quality of nursing tasks, quality of nonnursing tasks, and the quality of both nursing and nonnursing tasks differed significantly in the SUM and non-SUM units. An attempt was made to separate the effect of cost (staff size) and introduce SUM. Results of this analysis, measuring the change in quality showed that the cost per patient day was constant.

Even though the data in this study do not include turnover figures, the fact that more highly satisfied personnel are less likely to leave their jobs supports the conclusion that SUM units are likely to have a smaller turnover rate, resulting in a smaller professional shortage.

Patient units with SUM have more satisfied personnel than non-SUM units. Reduction of nonnursing tasks is associated with an increase in the satisfaction of nurses. One-hundred-eleven tasks were identified as potentially transferable to SUM. The activities list (appendix) is divided into eight areas. These are: general activities, directory, transporting patients, supplies, messenger service, supervisory responsibilities, indirect patient care (responsibility for completing the following communications), and indirect patient care (water pitchers). The study units were ordered according to the number of tasks assigned to nursing. Satisfaction of personnel is highly related. Beyond a certain point, transfer of tasks was not associated with increased nursing satisfaction. The satisfaction continues to increase if the transfer of activities is to SUM, rather then to other departments. This indicated that SUM helps clarify responsibilities. Nonprofessionals liked unit management though they remain less than satisfied. (These conclusions are supported by various figures and charts.)

The fact that unit management will set the stage for future development is based on interviews with individuals in the study hospitals and on general personal observations. Introduction of SUM forces nursing and administrators to look at patient care functions. This sets the stage for additional changes.

The purpose of the second portion of this report is to "explain unit management." The first task in planning for a unit management program is to clarify objectives. This establishes a basic premise as to the activities to be assigned to SUM, the orientation of the unit management program, and the organization structure for unit management. Three lesser decisions concern the extent of unit management, the qualifications of personnel, and the training investments required for success. A table entitled, "Distribution of Hospitals by Size, All Hospitals and Those with Unit Management" is based on *Hospitals, Journal of the American Hospital Association,* Part Two, Vol. 43, No. 15, August 1, 1969, p. 494 and *1969 Survey,* Bureau of Hospital Administration, the University of Michigan. The table shows all hospitals—7,137—ranging into groups from under 100 beds to over 500 beds; a total of 133 hospitals have SUM. On the basis of this table, the author states that generally small hospitals have not considered it, whereas teaching hospitals are among the most likely to introduce it, especially those hospitals serving as university medical centers.

There are seven different categories of tasks that can be made a part of the unit management department. The activities list in the appendix is mentioned as the method used to get a measure of what activities had been given to unit managements in the study hospitals. In the survey, over 98 percent of the 133 hospitals indicate that unit management had relieved nurses of activities in the areas of supplies, equipment, and maintenance. Eighty-nine percent of the hospitals had transferred traditional ward clerk activities. The transcription of physicians' orders was transferred to SUM in 76 percent of the survey hospitals. Thirty-one percent of the hospitals transferred patient transportation to SUM. Patient transportation was within nursing in 28 percent of the hospitals and maintained as a separate department in 41 percent of the 133 hospitals. Activities in areas of housekeeping were transferred to SUM in 17 percent of the hospitals and dietary activities transferred in 11 percent of the samples. The provision of nonprofessional direct patient care is a natural and significant extension of unit management. The problem of nursing's reluctance to allow unit management to serve the patient, rather than serve nursing, can be dealt with by allowing SUM to provide top quality "hotel-like" care to patients. Two hospitals were allowing SUM to use management skills in admitting, accounting, and other administrative responsibilities. The process of describing the variations in unit management is a description of a pattern of organization that varies from partial transfer of nonprofessional tasks from nursing to another department, to a pattern of thorough restructuring of individual roles and organizational responsibilities.

There are differences in attitudes that key personnel have toward the purpose of unit management. The advantage of a "serve nursing" orientation is the strong support it generates among nurses. However, the low status of SUM results from this serve-nursing orientation. The administration theme of bringing hospital administration to the patient unit is, in the study team's view, a more reliable orientation than the "serve nursing" theme. The "serve the patient" orientation is associated with lower nurse satisfaction than a "serve nursing" orientation.

The third choice a hospital must make is the structure of reporting relations. A chart suggests alternatives and indicates that unit management is evolutionary rather than revolutionary. Of 133 surveyed hospitals, 38 percent had placed unit management under nursing and 62 percent under administration. Complete transfer of responsibility for transcribing orders was done in 56 percent of the programs under nursing but in 66 percent of the programs not under nursing, indicating a more complete transfer of tasks in categories for programs not under nursing. The unit manager's "unit" was more than a single unit in over half of the survey hospitals. The typical manager had about six subordinates, two or three units, and about 80 beds.

The extension of SUM to departments other than patient units is logical. In only one hospital is this concept being introduced. There can be no honest transfer of responsibility when SUM is only responsible for assigned activities 8 a.m. to 5 p.m., 5 days a week. A substantial increase in personnel requirements and the complex scheduling problems must be forced to move to a 168-hours a week coverage. The author states that it is obviously better strategy to move totally from one system to another, if resources can be freed to do it well.

Unit manager qualifications depend on the activities to be transferred, orientation of the program, and the organization structure. If the hospital has selected the goals of professionalizing nursing and bringing the management of the patient units under hospital administration, the author suggests that the unit manager position will be a significant job, accepting the probable maximum stay of 3 to 5 years, and lessening the potential for moving up in that position from below. Comparison of unit managers' salaries showed a salary equal to or above the median head nurse salary of $750. Fifty-nine percent had salaries below the registered nurse level of $595.

Training of the unit manager is critical and lack of training will cause a program failure.

The kind of SUM preferred by the study team necessitates the acceptance of high initial investments, maximum activity and responsibility transfer, and a unit of 7 to 75 beds for intermediate care. The manager should be male and college educated. A 24-hour day, 7-day week coverage in all parts of the hospital should be maintained. Unit personnel should have patient oriented jobs, not skill oriented. Ancillary department costs will not drop as much as unit management costs. Decentralization will give the unit manager meaningful control and permit meaningful involvement in quality control with the physician and nurse.

The third portion of this report is a chapter entitled "Management of Change." Robert L. Smith, Ph.D., Assistant Professor of Psychology in Nursing and Research Associate in the Bureau of Hospital Administration, is drafter of this chapter. The author considered three levels that resist change that may cause good ideas to fail. The pre-implementation steps are extremely important if costs and damaging resistance is to be lessened. The change process includes development of roles. The nurses in SUM hospitals generally accept the unit management idea. The nurses felt it was possible to do their jobs better with unit management. The process of unit integration is the resolution of conflicts arising from two separate roles handling a set of tasks and responsibilities that was previously handled by a single person. The third phase of this process of change is system integration. Problems with other departments must be worked through.

Beyond Phase III is the expression of the author's feeling that moving toward some version of SUM in larger hospitals is an irreversible trend. Three hospitals had SUM in 1960, 20 hospitals in 1965, and an estimated 170 in 1970. The possibility of extending SUM to supervision of carrying out medical and nursing orders is being considered. Since some functions can be done more efficiently and cheaply at the unit level, decentralization is an avenue for extension of SUM. Another trend is the extension of professional management to other departments. There is a question as to the need for the registered nurse as we now know her. The new role for registered nurses will be one of more clinical responsibility. Successful unit management provides the opportunity to institutionalize the extensive utilization of clinical specialists. Decentralization may cause policy-making to be set at this unit level.

Findings.—

- There is no evidence that SUM either reduces or significantly increases personnel costs.
- SUM relieved nursing of responsibility for many nonnursing activities.
- There is a higher quality of patient care on SUM units.
- SUM units function more efficiently.
- Because of the relationship between turnover and job satisfaction, we infer less turnover in SUM hospitals.
- A SUM program provides the opportunity for additional important changes.
- Eight sets of activities can be transferred to unit management.
- Each SUM program can be characterized by the major purpose to which it is oriented.

Critique

A number of investigative efforts have been made toward the improvement in methods of ward management. The shortage of nurses, high cost of patient care, and continual efforts to improve patient care have presented the need for redelegation of nonnursing activities to appropriate departments and improving the method in ward management with cost consideration.

This monograph is not the formal report of a research study but is the explanation of the author as to why service unit management (SUM) should be instituted in hospitals. The kinds of SUM that exist are explained and the management of change in the SUM organization is discussed. Jelinek bases his opinions on research findings that are briefly reported in this publication.

This research study is described. Rationale for the study is provided in the foreword and a brief description of the study is included in the introduction. (An extensive annotated bibliography is included in the appendix.) The sample is large; eight hospitals are included in the study. Fifty-five patient units (32 with SUM and 23 without SUM), medical and surgical units were studied for 2½ years. Many variables were assessed in the measurement of: (a) personnel cost, (b) quality, (c) patient workload, (d) personnel satisfaction, (e) organizational tension and management style, (f) personnel acceptance of SUM, (g) assignment of responsibility for activities between nursing, SUM, and other departments, and (h) type of SUM organization. A well qualified committee was involved throughout the research program and in the interpretation of the results that provide the basis for this periodical.

The research design of the study and methodologies employed are only briefly described. Information in regard to the tools employed is sketchy and insufficient for evaluative purposes.

The periodical based on the research study is well written and supplies its readers with reasonable justification for the consideration of SUM in the hospital situation. Persons interested in ward administration should find this interesting and informative. Due to insufficient information in regard to the basic research, the authenticity of statements appearing in the publication cannot be established nor can any contribution to nurse staffing research design be determined.

A35. King, Paul F. "Personnel Utilization in Hospital Medical-Surgical Units." Unpublished Master's Thesis, School of Government and Business Administration, George Washington University, Washington, D.C., March 1967.

Review

Purpose.—"The objective of this report is to examine and evaluate personnel utilization studies made by CASH in trial medical-surgical units of four selected short-term, nonprofit, general hospitals in California."

Background information on CASH is described. The president of Blue Cross of Southern California, the regional director of Kaiser Hospitals in Southern California, and hospital administrators held seminars in five different areas of Southern California to decide the possibilities of management consultants to work on hospital problems. Eighty-six administrators volunteered to support a hospital management consultant commission, known as CASH. Before studying personnel utilization, CASH collected background information on 258 medical-surgical procedures. A time standard was assigned to each activity. The time standard is that time it takes an average experienced worker to perform a given task with normal allowance for personal fatigue and delay time. Four nursing service directors, appointed through the cooperation of the Hospital Council/California Nurses' Association Liaison Committee, provided professional guidance and continuing counsel. "In exchange for the services of CASH, member hospitals pay a base fee of $50 per month plus 35 cents per bed; the maximum fee any hospital pays is $250 per month." CASH is now dependent on the W.K. Kellogg Foundation for about 50 percent of its income.

CASH has found that from 65 to 75 percent of expenses are spent on payroll. Over half of payroll is attributable to nursing service. Since 80 percent of hospital beds are medical-surgical units, CASH chose this area to begin studying personnel utilization.

Sample.—The four hospitals were selected in consultation with Robert H. Edgecombe, executive vice president of CASH. These hospitals were representative of personnel utilization studies made by CASH in trial medical-surgical units of California short-term, nonprofit, general hospitals.

Instruments.—Current literature pertinent to the problem was surveyed.

Interviews were held with key representatives of CASH and with nursing personnel instrumental in helping CASH implement personnel utilization studies in trial medical-surgical units of hospitals. Interviews were tape-recorded.

A questionnaire and summary sheet report were used to interview nursing directors and their assistants. This questionnaire was reviewed by the hospital administrators and director of nursing service at Mills Memorial Hospital and an area manager for CASH. The questionnaire consists of 20 open ended questions. There are 30 nursing procedures listed on the summary sheet. Differences in the performance of these procedures are indicated as to before and after the implementation of CASH study. It asks for information regarding personnel who normally perform the procedure, average hourly time to perform each procedure, average daily frequency, present average hourly wage, and estimates of daily costs.

Procedure.—Four hospitals were described in terms of the implementation of the CASH study on the unit; the effect on the quality and quantity of nursing care, the effect on nursing administration, and the result of reduction of hospital costs.

Findings.—Each of the four units investigated consisted of approximately 35 beds containing medical or surgical patients. Team nursing was practiced on all units. The ratio of registered nurses to auxiliary personnel ranged from 30:70 to 50:50. After the CASH study, the ratio of registered nurses was increased on one ward from 30:70 to 40:60 percent.

The difficulties encountered in putting into effect the changes that were suggested as a result of the CASH study were similar on the units studied in three hospitals. The staff resisted change. They felt that industrial engineers could not understand nursing problems. The staff feared they might lose their jobs. The hospital with fewer implementation problems forewarned the staff of the study, assured them that no loss of jobs would occur, and that their opinions would be taken into consideration.

Since the completion of the CASH study, all hospitals showed an increase in the ratio of patients over 65 years of age. These hospitals were able to absorb the consequent increased workload without additional personnel. One hospital eliminated one aide on the evening shift and one aide on the night shift.

The quantitative level of patient care on four units was 5.3, 5.4, 4.6, and 5.8 nursing hours per patient. After the CASH study, the nursing hours per patient were 4.4, 4.5, 4.1, and 4.7.

The hospitals felt that the quality of care was increased. This opinion was based on an increased amount of patient comment commending the care they had received, fewer patient complaints about being hurried, and fewer physician complaints about shortcomings in quality of care.

The CASH study affected nursing administration by redistributing workload from one shift to another or from one person to another. Ten of the nursing procedures that were improved are described for each hospital. Some of these changes were: involvement of other departments (central supply, laundry, pharmacy, admission, messenger service, housekeeping) and their assuming more tasks; shift reports including only one person or the use of tape recorders, as opposed to the entire staff at staff report; head nurses relinquishing tasks of patient assignments and routine charting; patient categorization determining staff assignments; a new format for charts; installation of mechanical call system; a "prep" team to prepare all patients for surgery; new times for giving sleeping medications and taking temperatures; and medication rooms relocated. The payroll cost was not increased because there was no need for additional personnel. Communication and morale increased because of the personnel's involvement in the study.

The staff requirement report furnished by CASH on the basis of categorization of patient information sent in by the hospital helps nursing administrators in assessing and controlling staffing on medical-surgical units.

Critique

This study is an evaluative analysis of the impact of CASH services on four nursing units. No background for the study was developed, other than a historical review, describing the origin and growth of CASH, its purposes, financing and, in general, its methodology. One of the major forces in the development of a methodology for nurse-staffing has been the combining of administrative services for hospitals.

The author selected four hospitals from which to obtain data about *impact*. He defined *impact* by stating that it is reflected in change of hours of care, change of mix of staff members, cost, quality (as measured by comments), and the introduction of other supporting systems. One can raise questions about the looseness of the operating definition and also about the data obtained in the interviews. The sample included CASH representatives, four nursing directors and their assistants in hospitals served by CASH. Prior to its use, the instrument used in the interview was reviewed by individuals who likewise had a vested interest in the success of CASH.

The report is not particularly valuable except as a document endorsing the CASH methodology. It is unfortunate that the design of the study was not tightly conceived since many persons in nursing are suspicious of the CASH methodology. A critical review of its methodology would have been helpful.

A36. Kotar, Alice B. "Perceptions of Nursing Functions by Three Levels of Personnel." Unpublished Master's Thesis, University of Texas, Austin, Texas, June 1968.

Review

Purpose.—"This paper is primarily an effort ,to determine how the individuals of three levels of personnel, i.e., registered nurses, licensed vocational nurses, and nurse aides, view their own functions and those of the other two personnel levels."

Methodology.—Registered professional nurses employed on the staff nurse level, licensed vocational nurses, and nurse aides were studied at the University of Texas Medical Branch Hospitals. Personnel working the day shift on a general medical-surgical unit were given questionnaires. Nineteen of the 31 registered nurses, 10 of the 15 licensed vocational nurses, and 10 of the 19 nurse aides returned the questionnaires.

The instrument used was a constructed questionnaire submitted to review by a panel of knowledgeable members of the nursing profession in one school of nursing. "The statements were derived from the job description available at one institution (The University of Texas Medical Branch Hospitals) and are arranged so that there are an equal number of statements in each of the five categories identified by Butler (1961) for each level of practitioner." Several of the statements could be accomplished by more than one level of personnel. The five general nursing categories were physical care, supportive emotional care, patient education, liaison, and administration.

"Each participant was asked to check, to the best of her knowledge, the individual who actually performed the functions stated in the questionnaire." Instructions indicated that the subject was to check only *one* individual for each activity statement.

Findings.—

- "The questions at the end of the questionnaire were discarded due to lack of answers or to facetious answers."
- "In tabulating the questionnaire, the number of

observed responses were compared with the number of expected responses for each care category and level of practitioner."

- "It was demonstrated that there was a significant difference in the number of responses designating care category and level of practitioner than could be expected by chance through the use of chi-square method." The chi-square method was used to interpret in which care categories the sample subjects viewed the other two levels as functioning.
- "The total sample population designation of care categories to levels of practitioner was statistically significant." The entire group viewed the registered nurse and licensed vocational nurse as functioning in the areas of patient education and supportive emotional care and the aide group as functioning in the area of liaison and physical care. The registered nurses viewed themselves as functioning in all five areas, viewed the licensed vocational nurse group as not functioning in any of the five care categories, and viewed the aide group as functioning only in the area of physical care. The licensed vocational nurse group viewed themselves as functioning significantly in areas of supportive emotional care and physical care, viewed the registered nurse group as not functioning in any of the five categories, and viewed the aide group as functioning only in the area of physical care. The aide group viewed themselves as functioning in the area of liaison, physical care, and patient education and viewed the licensed vocational nurses as not functioning in any of the five areas.

Critique

Nursing functions, their allocation to individuals, and the skill and knowledge required to perform them continue to remain ill-defined and ambiguous. This study deals with the pertinent question of the perception of the performers as to "who does what." It aims to look at the discrepancies between stated function assignment and the actual performance assignment. It also raises the question of whether or not job descriptions for the professional are realistic and if changes are so rapid that descriptions are outmoded.

Unfortunately, the methodology is weak. The instrument is designed to force a choice in perception, since only one person could be designated as the *actor*. Therefore, all overlapping is eliminated. The research study really answers questions of: (a) what action is seen as being *performed* most often by only one level? It does not answer: (a) what overlapping is seen as occurring within levels? (b) what functions are seen as *exclusive* to one level?

The questionnaire is constructed in satisfactory form and was submitted to a group for face validity. There was no test for reliability, either through a test-retest procedure or interview method for interpretation of language meaning. Reference to the elimination of items leads one to believe that the reporting of responses may have been distorted.

The analysis of data was based on the appropriate use of chi square and treated properly. Differences in perception were examined for general categorization. The findings are based on the data.

The investigator draws upon the review of studies in nursing that deal with role conflict and role definition, and with nursing functions to a degree. Unfortunately, she does not draw upon the knowledge base in sociology or social psychology that describe the concepts of role, its determinants, evolvement, differentiation, and conflict.

The study contributes primarily by raising questions about function differentiation and the use of levels of personnel in planning of staffing. It indicates, or rather infers, that the perception of "who does what" is based not only upon training programs but upon the setting of expectations about performance of specific functions and the enforcement of those expectations. This is a vital point in planning for staffing and the effectiveness of the plan. Position descriptions are suggested as very loose guides for setting expectations. Since the data are questionable, no knowledge can be based upon the findings.

A37. Lamberton, Martha. "An Investigation of the Validity of Herzberg's Motivation-Hygiene Theory for Hospital Staff Nurses." Unpublished Master's Thesis in partial fulfillment of course N701, University of Pennsylvania, Philadelphia, Pennsylvania, May 1970.

Review

Purpose.—To test the validity of Herzberg's theory for hospital staff nurses by replicating part of Herzberg's original study.

Specific questions are (a) What concrete job events do nurses think caused them to experience a period of overall job satisfaction, and what concrete job events do nurses think caused them to experience a period of overall job dissatisfaction? (b) Do nurses mention one set of factors while talking about job satisfaction and a different set of factors while talking about job dissatisfaction? (c) Do nurses in the study population mention Herzberg's motivators when talking about job satisfaction and Herzberg's hygiene factors when talking about job dissatisfaction? (d) What effects do the nurses think their feelings of job satisfaction or dissatisfaction had?

The Motivation-Hygiene Theory states that the factors that lead to job satisfaction are separate and distinct from the factors that lead to job dissatisfaction. Herzberg calls the factors that lead to job satisfaction the *motivators,* because they are effective in motivating the individual to superior performance and effort. Herzberg calls the factors that lead to job dissatisfaction the *hygiene* factors because they appear to meet man's need to avoid pain.

Methodology.—This study was limited to staff nurses employed full time by a general voluntary, nonprofit hospital, located on the east coast. The bed capacity was 658. Only those staff nurses who had been employed full time for at least 1 year and who have English as a native language were considered for study. Forty-six nurses of the 187 full time staff nurses met these qualifications. From this population, a sample of 20 was drawn at random. Four nurses from the original sample refused to participate in this investigation. Nineteen nurses were interviewed.

The method and design of the present study were adapted from Herzberg's investigation. A pilot study was conducted to investigate the feasibility of conducting this study within a population of nurses, to give the investigator experience in using a semistructured interview, and to see if the stories related could be analyzed. Five nursing students were used in the pilot study. Some minimal changes were made in the interview, following the pilot study.

The implementation of the interview is reviewed. The investigator took notes as the nurse related a story about a period of job satisfaction and a period of job dissatisfaction. Only two stories were collected from each nurse: one relating to a satisfying and one relating to a dissatisfying period of time.

The first step in the analysis of data collected was to identify the factors that the nurses had mentioned as having led or contributed to a period of extreme job satisfaction or dissatisfaction. Each interview was analyzed for objective job events that the nurses mentioned as having led or contributed to job satisfaction or dissatisfaction, and for effects that the nurse mentioned as having resulted from one of the feelings. All factors that talked about similar job events were placed in the same group. The theme of each group was based upon those which Herzberg identified in his study. The nine themes that evolved are achievement, the work itself, self-growth and development, interpersonal relationships, responsibility and authority, working conditions, supervision, hospital policies, and recognition.

In order to validate the Motivation-Hygiene Theory (certain themes should be mentioned significantly more often in stories about job satisfaction; other themes should be mentioned significantly more often in stories about job dissatisfaction), it was necessary to subject the data to statistical analysis. The null hypothesis states that there is no difference in the frequency with which a given theme appears in stories about job satisfaction and about job dissatisfaction. By inspection, the investigator decided that the themes, working conditions, and hospital policies, occur with equal frequency in stories about satisfying and about dissatisfying experiences. The Fisher exact probability test was used to analyze four themes having a frequency of less than five. The null hypothesis is not rejected for these four themes: self-growth, interpersonal relationships, work itself, and recognition. Using chi squares to determine a relationship between the mention of a theme and job satisfaction or dissatisfaction, achievement and responsibility themes were mentioned significantly more often in stories about satisfying job events and the supervision theme was mentioned significantly more often in stories about dissatisfying job events.

Findings.—The themes mentioned most often by different nurses had to do with achievement—the success or failure of bringing a task to completion. Other themes mentioned frequently have to do with coworkers, some act of notice given by other people with whom nurses come in contact on the job, the rewards coming from actually doing the job, and an opportunity to learn. The theme mentioned least often had to do with hospital policies, such as benefits and working hours. Interpersonal relationships with coworkers were mentioned proportionately more often than it was in Herzberg's study population.

The Motivation-Hygiene Theory was partially validated. All nurses who admitted to some effects resulting from the experience of job satisfaction said that the feeling increased their commitment to and performance on the job.

Implications.—A supervisor could promote job satisfaction by giving staff nurses an opportunity to achieve, assume responsibility, to form cooperative and friendly relationships with coworkers, and by making provisions for a nurse to be noticed, whether it be by a nursing service personnel or by doctors.

Critique

This is a master's thesis dealing with a subject relevant to staffing satisfaction. The study, though limited, proposes insights and raises questions about further examination of *job satisfaction* and *job dissatisfaction* as two separate concepts. The data suggest that factors other than hospital policies and staffing may influence each.

The theme that appeared most frequently in the 19 interviews was *achievement*—the success or failure to bring a job to completion. This study suggests that achievement of practice within the hospital setting may be related to psychological perception of achievement rather than actual achievement itself. In basic educational programs, the student may be taught to perceive that which is neither feasible or required. The study also implies that the hospital setting may contain constraints that make reasonable achievement impossible. It may be that nurses have not been taught to evaluate their own achievements rationally and realistically.

The study is based upon a sound theoretical framework. The procedure is well described. However, the research has many limitations. The sample was small and nonrandom. No test of reliability of instruments was made. There was no use of experts to check reliability of classification of themes.

In spite of its faults, this study serves as a pilot exploration and identifies an idea that merits further development. The relation among the variables of sense of achievement, workload expectation, and quality of work performed cannot be overlooked in a proposal involving staffing.

A38. Langford, Teddy Lynn. "Learning Needs of Registered Nurses in a Selected Group of Hospitals." Unpublished Master's Thesis, University of Texas, Austin, Texas, May 1970.

Review

Purpose.—To determine the learning needs of registered nurses for use as a prime indicator of content areas for inservice education.

To test and possibly refine Price's questionnaire and method of coding responses for use as a standard test for evaluation of learning needs of registered nurses.

Sample.—A total of 68 questionnaires were returned from 169 nurses employed in positions in medical and/or surgical nursing in all four accredited hospitals in Austin, Texas. The hospitals are described and include a 250-bed general municipal hospital, a 152-bed community general hospital operated by a religious order, a 212-bed community general hospital, and a 167-bed hospital owned by the Austin diocese of the Catholic Church.

Instrument.—The questionnaire was a revision of the instrument used by Price to study the learning needs of nurses in the Minneapolis area. The instructions on the questionnaire emphasized needs for learning rather than content for inservice programs since the respondents' ideas of what inservice should be might influence their responses. Demographic data requested include education level, date of licensure, date of employment, and period of employment. The learning needs were elicited by asking respondent to first, describe a work related incident for which she felt least well prepared and, second, to state the learning most needed by her to improve care. The nurse was asked to indicate whether this incident occurring on the shift usually worked. Four option responses concerning the reason for lack of preparation for the incident reported are the same as those determined by Price. The second question asks for an explicit statement of the "specific learning which would be most helpful in improving the quality of patient care for which you are responsible." Five options, indicating a specific learning, are • review, • learning in depth, • new knowledge, • learning related to new administrative responsibility, or • familiarization with the particular hospital.

Procedure.—The questionnaires with an instruction-introduction sheet were taken to each unit. Returns were promoted by the nursing service director or associate director or by reminders issued with paychecks.

Price's study lists categories of learning needs. Langford's study states that the description of the coding method is explicit but specifications of characteristics of responses that belong to a certain group are less specific. To analyze the responses, she isolated the core thought of the critical incident and used the first stated need. She also concluded that statements regarding no learning needs indicated a learning need. After all usable responses were categorized, a registered nurse also categorized the critical incident responses and expressed learning need according to Price's categories. The overall agreement was 80 percent.

Because this agreement was considered unsatisfactory, explanatory statements to accompany learning need categories were developed. It was decided that the data not be categorized by Price's hypothetical inservice program. Explanatory statements were developed to accompany the learning need categories from the description and verbatim reports of questionnaire responses in Price's monography. Ten questionnaire responses were chosen by a registered nurse and categorized with a 90 percent agreement with the investigator. A licensed vocational nurse repeated the same procedure, resulting in a 100 percent agreement.

Findings.—Of the 68 returned instruments, 34 were considered completely usable since they offered some type of description of critical incident and learning need as well as choices of options. Demographic data were analyzed on 81 instruments.

The percentage of questionnaires returned from each hospital varied from 20.6 percent to 34.9 percent. Usable replies from each hospital varied from 35.7 percent to 66.6 percent.

The demographic characteristics and the learning needs for the participating nurses appeared similar for all hospitals. There evolved no particular patterns of needs by shift or functional role. Because the majority of nurses listed postbasic educational experiences as consisting of workshops, it seems that this type of presentation might attract large numbers of participants. A large number of responses indicated a lack of recognition of any learning needs. This may indicate the need for some type of effort toward developing the awareness of the individual as to her ability to determine her own strengths and limitations.

"The very small number of respondents providing all of the information requested in the critical incident question suggest that the emotion surrounding an incident for which the nurse was least well prepared may influence her ability as a reporter of the situation." The greatest number of learning needs identified was for information concerning the care of specific patients, especially those with a cardiac arrest or arrhythmias. All of the hospitals have had frequent and recurrent programs relating to cardiac arrests.

Leadership and management were identified as the greatest learning needs by 35 percent of the respondents. "Learning in depth and new knowledge were most frequently cited as needed to supply adequate learning."

"It can be concluded, however, that this method, as utilized by Price, can elicit learning needs of registered nurses."

Critique

The problem of this study is only indirectly related to the question of staffing. The finding that a large number of responses indicated a lack of recognition of any learning needs is pertinent, however. The effect of a change in staffing pattern, mix, and production may be limited by the inability of some staff nurses to recognize what patients essentially require.

The thesis is a descriptive study to test the appropriateness of the methodology proposed by Price in one local setting. A slight modification in methodology was made as suggested by the originator. The return of the questionnaires was very small (20.6 to 34.9 percent). This small return restricts the value of the findings.

A39. Lenz, Philomene Elizabeth, "A Time Study and Activity Analysis of Four Night Supervisors in Four Selected Hospitals and a Comparison of These Activities." Unpublished Master's Thesis, University of Washington, Seattle, Washington, 1960.

Review

Purpose.—To do a time study and activity analysis of four night supervisors in four selected hospitals and make a comparison of these activities in order to determine what kind of activities the night supervisors were performing, how much time was spent on each activity, and the degree of variation in the activities among the selected hospitals.

Sample.—Four general, nonprofit hospitals that had intern and residency programs and were comparable as to bed capacity and distribution of patients.

The period of observation was two 8-hour periods between Monday and Friday for each night supervisor. This time totaled 3,840 minutes.

Instrument.—The time and activity methods designed by the USPHS for study of supervisor activities and for study of nursing service in an outpatient department.

The direct time study method consisted of the observer following the night supervisor at all times for 2 nights and recording the area of activity, level of skill required for each task performed, when the activity occurred, and with whom.

The major areas of activity according to Elinor D. Stanford, et al., *How to Study Supervisor Activities in a Hospital Nursing Service* (C36), were patient care activities, personnel activities, unit activities, personal, and standby. Three of these were subdivided into such categories as exchange of information, inservice development, hospital policy, and procedure. Levels of activity were determined on the basis of the degree and kind of skill, training, knowledge, authority, and responsibility required for successful performance of the activity. The places where the activity occurred were nursing office, nursing unit, diet kitchen, pharmacy, and other departments. The persons with whom the activity was involved were hospital administrative assistant, nursing director or assistant, supervisor, head nurse or charge nurse, unit staff, patients, etc.

Procedure.—The purposes, method, and conduct of the study were explained to the four supervisors.

A pilot study was conducted to determine the adequacy of the instrument and to orient the observer. Some changes in the observation form resulted.

Observations were made in each of the four hospitals when only one regularly assigned supervisor was on duty. The time, activity, level of activity, place, and with whom the activity occurred were coded on the observation form. Time spent in travel was credited to the last activity. When the act was not obvious from the night supervisor's overt behavior, an explanation of purpose was given.

The data were computed and tabulated to show the minutes and percentage of time each night supervisor spent on each activity, the level of activity, where the activity occurred, and with whom. The totals for the four supervisors were computed and tabulated to show collectively the total minutes in each area. Comparisons were made to show the degree of variation.

Findings.—The findings indicate that, on the average, the four night supervisors spent the greatest proportion of their time in the area of activity concerned with patients, an average of 46.4 percent with a range from 40.5 to 50 percent. The most time-consuming activity in this area was "exchange of information," which included verbal reports and communications concerning patients. "Other direct care," which included activities that took place in the presence of the patient such as evaluating the patient's need for care and observing his physical condition, ranged from 1.4 to 15.3 percent of the time.

The second most time-consuming area was the personnel area, ranging from 20.7 to 35.6 percent. The activity described as "allocation," including activities such as assigning and reassigning of personnel, planning, checking, or copying of time schedules, consumed an average of 10.8 percent of this time. Inservice development utilized an average of 9.7 percent of the time. The personal area averaged 10.8 percent of the consumption of total time.

The time spent in the unit area ranged from 5.2 to 16.5 percent. In this area, activities concerned with procurement of drugs utilized the greatest amount of time, an average of 3.5 percent. Standby area consumed the least amount of time, only 6.7 percent.

The four supervisors spent nearly one-half of the total time on the nursing units; and, an average of 40.3 percent of the time in the nursing office. Time spent with others averaged 21.6 percent with the charge nurse, 8 percent with patients, and 6.5 percent with other nursing unit staff.

The time spent on the various levels of activities showed that, on the average, 65.1 percent of the time was spent as night supervisor or director of nursing level, 11.1 percent at head nurse level, 10.6 percent at clerical level, and 3.5 percent at pharmacy level.

Conclusions.—Differences in the time each supervisor spent in major areas of activities appear to be related to expectations of the position of the night supervisor in the organizational pattern. The degree of variation within the major areas appear to be related to the emphasis placed on various activities in the expectations of the position in the organizational pattern and upon the administrative policies of the particular hospital. The four night supervisors spent almost 90 percent of their total time in the nursing units and the nursing office. The four night supervisors performed at the night supervisor or director of nursing level an average of 65.1 percent of the time.

Implications.—Particular attention should be given to the time spent on nonnursing functions and time spent at other levels of activities in nonsupervisory functions.

Critique

The study of night supervisor's activities is relevant to the need for reallocation of duties for better utilization of personnel and reassignment of nonnursing functions. This thesis presents an analysis of night supervisor's activities, kinds of activities, time spent on each activity, and degree of variation of activities in four study hospitals. Premises for the study are well outlined and substantiated through the relevant literature review.

The method employed was the direct time study method. The time and activity methods designed by the USPHS for study of supervisor's activities and for study of the nursing service in inpatient and outpatient departments were used as a basis for the study. Rationale for selection of this method is sound. The comparative study of supervisor's activities among the study hospitals is the innovative feature.

The tool used in collection of the data was patterned after the form designed by Stanford. The test for reliability of the tool is less than adequate. It is assumed that observations were made by the investigator. Information in regard to the use of the tool is provided.

The sample is small, limited to the study of activities of four supervisors in four hospitals for 16 hours each, but there is sufficient evidence to indicate that there are considerable variations in night supervisor's activities from one hospital to another.

The study presents a methodology that could be used by nursing administrators in assessing the activities of the night supervisor.

A40. Levine, Eugene. *A Comparative Analysis of the Administration of Nursing Services in a Federal and Non-Federal General Hospital.* Unpublished Doctoral Dissertation, American University, Washington, D.C., May 1960.

Review

Purpose.—To conduct a comparative analysis of the nursing services in three general hospitals.

Hypotheses.—(a) "The ratio of the number of nursing personnel to patients maintained by a general hospital is related to its patients' requirements for nursing services. (b) The ratio of the number of nursing personnel to patients maintained by a general hospital is related to the level of adequacy of nursing services provided to its patients. (c) The ratio of the number of nursing personnel to patients maintained by a general hospital is related to its organizational characteristics."

Rationale.—The hypotheses raised the questions as to whether lower staffing in the USPHS hospital might be due to less demanding patient needs, less adequate fulfillment of patient needs, or the influence of organizational characteristics.

The review of literature for this study compiled data provided by the USPHS, the ANA, and the AHA.

Sample.—Three general, short-term hospitals.

A USPHS hospital was decided upon in lieu of a VA hospital because it more nearly approximated non-Federal hospitals. The typical patient in a Department of Defense hospital is much younger than the average patient in a non-Federal hospital. The USPHS Hospital located in Boston, Massachusetts, had 247 beds, an average census of 186 patients, and a nurse-patient ratio of 49.9 personnel per 100 patients. Arlington Hospital in Arlington, Virginia, and Suburban Hospital in Bethesda, Maryland, had 250 and 228 patients, were non-Federal, voluntary, community hospitals serving a similar population. None of the three hospitals had professional schools of nursing.

Instruments.—Form 1 entitled "Nurse Staffing Data" was completed by directors of nursing service. To supply information regarding nurse staffing, the information requested was: name of hospital, total number of beds, current census, average daily patient census, average length of stay of patient, employment status of full-time and part-time nursing service personnel, vacancies in nursing service positions, assignment of nursing service personnel currently employed for patient care, and a record of nursing personnel giving direct patient care for a 24-hour period.

The Johns Hopkins Operations Research Method of Categorization of Patients was utilized by head nurses in determining patients' requirements for nursing services. The factors utilized in this patient classification system are as follows: ambulatory status; assistance needed for bathing; assistance needed for feeding; and the existence of certain characteristics such as incontinence, isolation, unconsciousness, and marked emotional disturbance. Based on the ratings, patients were classified as intensive care, intermediate care, or minimal care patients. The head nurses in the Federal hospital rated 600 patients over an interval of 2 weeks. A total of 1,650 ratings were made in one non-Federal hospital. A reliability check on these ratings made in the study hospitals revealed a .92 reliability coefficient between independent ratings of the same patient.

The volume of medication, treatments, and time consuming procedures was obtained from a tally of doctors' orders entered on nursing care plans (kardex) in the Federal hospital. Comparable statistics were not available from the two non-Federal hospitals. Data were compared to the form in the non-Federal hospitals studied by Marion J. Wright, *Improvement of Patient Care.* (A441)

Medical records libraries supplies statistics about volume of laboratory services and other diagnostic tests in the Federal hospital. These data were compared to data from Louis Block, "Prototype Study: 200 Bed Hospital," *The Modern Hospital,* 92:103–110, June 1959. The two non-Federal hospitals in this study are included in Block's hospitals.

The methodology used to measure the adequacy of nursing services was developed by Abdellah in 1955. (C1) The Measure of Patient and Personnel Satisfaction with Nursing Care was used in 60 general short-term hospitals in 1956. Checklists consisted of 50 described incidents in which specific needs for nursing service were omitted. A separate checklist was used for patients and personnel. The patients were instructed to check those items that occurred during their hospitalization and occurred during the preceding week. A weight was assigned to each item in terms of its importance to the total welfare of the patient. Value of the weight indicates importance of item in terms of quality of patient care received. The five categories range from least important to most important. Examples of items from patient checklists and corresponding weights are as follows: Room was too chilly to sleep—4. Air in room was poor—1. Food was served in a hurry—2. Drinking water wasn't changed—3. The personnel checklist included such items and weights as follows: Patient did not receive needed medication—5. Patient left without signal cord within reach—4. Nurse given too much work to do—3. Aide had too much cleaning to do—2. Patient given cold bedpan —1.

Data were obtained from 8,660 patients in 60 non-Federal hospitals and 831 patients, representing 55 percent of total patients in eight matched non-Federal hospitals. In the Federal hospital, 119 patients, 60 percent of the total, participated as did 45 personnel, including nine doctors. Data for the eight non-Federal hospitals were obtained from 556 nursing personnel and 213 physicians. The 60-hospital study included 7,200 nursing personnel and 2,100 doctors.

The theories of Barnard and Simon were utilized in delineating organizational characteristics that could be used for comparative analysis. The organizational environment included physical plant, layout, fiscal resources, supplies and equipment, the community setting, and historical development. Formal organizational structure is defined by Barnard and can be represented by the organizational chart. The ongoing strain of relationships among members of the formal organization represents the informal organizational structure. The most important of all organization characteristics may be the members. Operating services are the actual physical work of organizations. Administration is the maintenance of the organizational system in operation.

The organizational environment was studied by direct observation, by analysis of written documents and publications, by personal interviews, and by use of forms for data collection. The hospital data-statistical form included information such as: total number of beds, other facilities, total number of vital statistics for 1 year, financial information, number of personnel—departmental, and number of medical staff appointments. The organizational structure was explored through: use of charts; analysis of policy statements, procedure manuals, and other documents; and personal interviews. A picture of the informal organization was obtained through direct observation, personal interviews, and analysis of interpersonal contacts of directors of nursing, using a record of activities of directors as a guide. Five forms were used to study members of the organization. These were concerned with turnover of personnel, educational preparation of professional nursing service personnel, experience level of professional nursing service personnel, educational preparation of auxiliary nursing personnel, and experience level of auxiliary nursing service personnel. Direct observation, personal interviews, analysis of policy and procedure manuals, memorandum, minutes of meetings, and other documents were the methods used to study operating services and administrative services. The study of the activities of directors of nursing service provided data about adminstrative processes and degree of delegation.

Procedure.—To determine the relationship between staffing and workload, the three hospitals were compared. The number of beds (247, 200, 250) and the average daily census (186.5, 167.0, 228.4) compared closely. Patients in the Federal hospital stayed an average of 19.6 days, whereas days of patient stay were 5.9 and 6.4 in the other two hospitals. The number of full-time personnel ranged from 92 in the Federal hospital to 134 and 231 in the other study hospitals. The range of part-time personnel was 8, 93, and 124 and the range of administrative personnel was 12, 14, and 28. The number of professional staff nurses, practical nurses, nursing aides and orderlies, and clerks were also compared. The ratio of number of full-time nursing personnel employed per 100 average daily patient census was compared for the three hospitals as were the average daily hours of bedside nursing services available per patient.

The study of patients' requirements was conducted in the Federal hospital and in one non-Federal study hospital. A chi-square test was applied to the data from the two hospitals and proved the difference in patient care requirements. Based on the research at Johns Hopkins Hospital, intermediate care patients require twice as much time and the intensive care patients five times as much time as the minimal care patients. These weights were used to compute an estimated 20 percent increase in staffing, which would still be a lower ratio than that existing in the non-Federal hospital. The distribution of patients according to the classification system used by Marian J. Wright, *Improvement of Patient Care,* in four hospitals showed that only one hospital had care requirements higher than the non-Federal hospital in this study. However, use of the methodology applied in equating the Federal and non-Federal hospital showed that the Federal hospital could still operate with fewer personnel. The Federal classification system used by the Federal hospital suggested higher ratings than were obtained from the Johns Hopkins methodology.

The adequacy of nursing services was based on the checklists submitted by patients and personnel. The frequency with which each item was reported times the numerical weight was figured. The averages of these scores were compared for each major category for the non-Federal hospital, eight matched non-Federal hospitals, and the 60 random hospitals. Examination of the category scores showed three areas less adequate in the Federal hospital: rest and relaxation, dietary needs, and contact with nurses. In only the dietary needs category was the Federal hospital significantly less adequate than the U.S. sample. The adequacy of nursing as evaluated by personnel in the Federal hospital compared with the matched non-Federal hospitals showed a statistical difference in eight categories.

To determine how much of an increase in staff would be required by the Federal hospital to equate adequacy of service, an estimate was determined. An additional ½ hour of care requires a staff of 9.7 bedside nursing personnel and 3.6 administrative personnel per 100 patients. (The average nursing personnel works 5.15 hours per day. Thirty minutes per day equal 50 hours divided by 5.15 equal 9.7 bedside personnel requiring 3.6 administrative personnel.) This additional staff represents a 27 percent increase in the existing ratio.

The organizational environment was analyzed accordng to the historical development of each of the three study hospitals. The distribution of patients in the Federal hospital by beneficiary status was based on the monthly report of inpatients. Analysis of the community setting shows that the non-Federal study hospitals are community hospitals in the full sense of the term. The physical structure and layout are described in terms of the number of beds for each service on a particular unit in all three hospitals. The Federal hospital has five unit designations; the other hospitals have nine and eight units. In general, the condition of the equipment in the Federal hospital was less modern than in the two non-Federal hospitals. The Federal hospital was the only one that was operating under a formal financial budget. The financial data compared in the three hospitals and the 200 hospitals in Block's study consisted of assets, annual expenses, total annual payroll, nursing department annual payroll, percent payroll of total expenses, total annual expenses per patient day, total annual payroll per patient day, and estimated nursing department annual payroll per patient day. Twenty-five separate services and facilities available in the three study hospitals and Block's 200 hospitals were compared.

The areas studied in organizational structure were total hospital structure, organizational structure of the nursing service department, and informal organization in the nursing department. The organization charts of the Federal hospital and one non-Federal hospital can be subjected to a more extensive outside review. There is no analogy to the board of trustees of the non-Federal hospital in the Federal hospital unless it is the U.S. Congress. The organization of the medical staff differs most significantly in the two types of hospitals. A numerical comparison shows the Federal hospital under a total of 91 medical staff members; whereas, the two non-Federal hospitals are served by 732 and 518 medical staff members. The total is made up of active and house staff, consulting, and other medical staff members. The number of personnel employed by 10 hospital departments is shown. The total nursing personnel, expressed in full-time equivalents, assigned to each study hospital is 33.9 for the Federal hospital and 53.2 and 51.1 for the other two hospitals. Organization charts of the nursing department are shown for the Federal hospital and one non-Federal hospital. The number of positions (for each level of personnel and each shift) are compared for the three hospitals. The status and prestige system are compared for the two types of hospitals. The elements of informal organization that were studied were informal authority by means of tenure and informal behavior on the job.

To determine if lower staffing in the Federal hospital was accounted for by characteristics of members of the organization, age and marital status, experience and education, and turnover behavior were examined. The average age of each level of personnel was compared in the three hospitals. The percentage of each level of personnel that were married is charted. Another table depicts the average years of experience prior to present employment and the average years of experience in the present job. Data from Dorothy E. Reese and Stanley E. Siegel's article "Educational Preparation of Nurses Employed in Non-Federal Hospitals," *Hospital Management*, 1960, showed the percentage of professional nurses with college degrees. Four levels of education were compared in each hospital and all U.S. hospitals. The number of accessions of nursing personnel in the three study hospitals were compared as were annual turnover rates among nursing personnel in the three hospitals and U.S. sample based. The annual instability rates were also compared. The three measures used to analyze turnover were • the ratios of total employees who left the nursing department to the average number employed in a 12-month period, • the instability rate was the percentage of employees on the payroll on one date who quit their jobs within 1 year, and • the analysis of turnover was the percentage of persons who were employed within 1 year.

The characteristics of bedside nursing services that were compared are the parallel three shift system, the pattern of staffing, content of activities that took place on the bedside unit, and ways in which specific procedures were carried out in supporting services. Housekeeping, laundering of patients' linen, preparation and delivery of drugs, preparation and delivery of equipment and supplies, escorting of patients, preparation and delivery of food, and operating services are examined. Study of nursing services in operating room, delivery room, and outpatient departments was made. The difference in these services accounted for the five fewer personnel needed in the Federal hospital.

Administrative techniques were compared. The Federal hospital had policies and procedures in writing and maintained a practice of review. There were two kinds of written plans in the study hospitals. There was no formal budget in the non-Federal hospitals. The personnel programs, recruitment, selection and placement, classification, pay and benefits, promotion, separation, counseling and handling of grievances, incentive awards, health and safety, evaluation, training and staff development, communication methods, control techniques, and reappraisal methods were compared. The activities of the directors of nursing service were studied for 1 week. Data were obtained from detailed records prepared by the directors. The percentage of time spent on activities involving interpersonal contacts, the average duration of time directors spent in interpersonal contacts, percentage of time spent on administrative processes, and time spent on content areas of activities were analyzed. A summary analysis of the character of administration is presented.

Conclusions.—The data indicate that each of the factors contained in the three hypotheses provides some possible explanation for the differences in nurse staffing between the study hospitals. Twenty percent of the total difference could be attributable to a lighter workload, 20 percent could be due to understaffing, and 60 percent seems to be related to difference in organizational characteristics. The characteristics of the Federal hospital contributing to lower staffing were: use of open wards; more simplified organizational structure with larger, more homogeneous and more flexibly staffed subdivisions; lower turnover among personnel; use of a central dining room to feed nearly half the patients; and more conscious utilization of administrative techniques and processes including an effective system of personnel policies and a comprehensive budget system that forced attention to matters of economy and efficiency.

Other significant differences follow: The Federal hospital was older and had attained a stable period in its growth patterns. Public relations were less of a concern to the Federal hospital since it did not rely on the community for financial support or services. The Federal hospital provided a smaller range of services per patient day but the patient in the Federal hospital received more services during his total stay. Expenses per patient day were lower in the Federal hospital. The USPHS was a source of advice and information to the Federal hospital. The Federal hospital, as a part of the U.S. Government, worked with a framework of policies, regulations, and systems. The board of trustees was very active in the non-Federal hospitals. The Federal hospital possessed considerable autonomy for its internal administration. The Federal hospital placed doctors within the organizational hierarchy. Many more doctors provided care to patients in the non-Federal hospitals. The numbers of personnel assigned to services were higher in the Federal hospital. The number of different categories of nursing service personnel was higher in the Federal hospital. Part-time professional staff nurses comprised a larger share of the nursing staff in the non-Federal hospitals. There was a higher proportion of professional nurses and higher proportion of nurses in administration in the Federal hospital. Nursing personnel in the Federal hospital were older, more experienced, more educated, and fewer were married.

Critique

Consistently lower staffing ratios of nursing personnel to patients are found in Federal hospitals as compared to non-Federal hospitals. In seeking solutions to the nurse shortage problem, investigators have felt that answers may lie in the unique characteristics of the Federal hospitals. Using two non-Federal hospitals and one Federal hospital in his study, Levine proposed to determine why Federal hospitals could operate with fewer nursing personnel than non-Federal hospitals. This study, in a sense, also represents the extension of the Abdellah and Levine study.

Levine bases his study on three hypotheses. He proposes that ratio of number of personnel to patients maintained by a general hospital is related to: A. *Its requirements for nursing services:* • staffing patterns; • patient requirements for nursing services; • volume of medications, treatments, and time consuming procedures, laboratory services, and diagnostic lists; B. *Adequacy of services:* • evaluation by patients of the extent to which patient requirements for nursing services were unfulfilled, and • evaluation by personnel of the extent to which patient requirements for nursing services were unfulfilled; and C. *Organizational characteristics:* • organizational environment, • organizational structure, • members of organizations, • operating services, and • administrative services.

The theoretical framework of the study is well developed. Premises lead to a logical conclusion. An extensive literature review is included. A large bibliography and glossary of terms are found in the appendixes.

The research design includes the investigation of a great number of variables. This necessitated the use of several methodologies in the collection of data such as direct observation, interviews, and analyses of documents, charts, procedures, manuals, statistics, etc. The classification system developed at Johns Hopkins under the guidance of Charles Flagle was used in the measurement of patients' requirements for nursing services. Adequacy of nursing services was assessed through the use of an instrument developed by Abdellah and Levine. In the study of the organizational characteristics of hospitals, theories of Barnard and Simon are applied. The study of the organizational characteristics is the innovative feature of this investigation and necessitated the study of many variables, which Levine has accomplished in a very systematic fashion. However, his report devotes a great deal of space to descriptions and interpretations of findings, while descriptions of procedures used in the securing of data are deficient. Orientation procedures for personnel involved in the study are lacking. Samples of the tools are provided in the appendixes.

The assessment of adequacy of nursing services based on satisfaction ratings of patients and personnel is less than desirable due to the inherent subjectivity and bias found in the ratings. The instrument appears to be designed to measure nursing services in relation to the patient's comfort rather than quality of care.

The samples of collected data are large. In some situations, the investigator collected data in a number of Federal and non-Federal hospitals to validate his findings.

This appears to be a comprehensive study that provides many answers to why Federal hospitals are able to operate with fewer nursing service personnel than non-Federal hospitals. The investigation of the organizational characteristics, which included the study of many variables, is innovative and in this respect contributes to nursing service research design. Methods for securing data are not new or well described. This study provides a considerable amount of information for hospital and nursing service administrators interested in nursing service staffing. It also provides a unique study approach that should be of interest to those concerned with nursing service staffing research and with the development of models of the delivery care system.

A41. Lewis, Charles. *A Privileged Communication—The Dynamics of Nursing in Ambulatory Patient Care.* Final Research Report, USPHS Grant (NU 00145) 1969.

Review

Purpose.—"This project has merely made an effort to introduce the role of the nurse as a primary care giver into a more formalized system and to measure in quantitative fashion some of the activities and outcomes when ambulatory care is given by nurses in an overt rather than a covert manner."

Methodology.—The first study setting was the Outpatient Department of the University of Kansas Medical Center (KU). The majority of patients are indigent and aged. Patients are assigned appointment times in the general medicine clinic and are seen by fourth year medical students supervised by faculty members or medical residents.

The second study setting is the Kansas City General Hospital (KCGH), serving only the indigent of Kansas City, Missouri. Patients are seen, in order of presenting themselves, by physicians on the staff or by physicians who volunteer their time, or by physicians who are employed part time at an hourly rate.

The majority of patients at both clinics were female and nonwhite. The median age at KU was in the range (50–59) and at KCGH (60–69). Most of the patients were in social class V (Hollingstead), although the population of KCGH clinics was poorer and less educated than at KU. Half of the patients at KU were married; the majority at KCGH were not married. The relative rate of unemployment was higher at KU, although the majority of patients in both institutions were unemployed.

Five diagnostic categories were selected to define the population. The categories included: • hypertensive cardiovascular disease, • psychophysiologic heart reactions, • arteriosclerotic heart disease, • erogenous obesity, and • rheumatoid and degenerative arthritis. Charts of patients coming to the clinic were reviewed by a member of the research staff to insure that patients selected with these diagnoses would be in a relatively stable phase of their illness. When a patient met the specific criteria (listed in appendix A, not included in report), the physician responsible for previous care was contacted to secure permission to include the patient in the study. At KU, 66 patients were identified and substratified according to age, race, sex, and diagnostic classification. These were randomly allocated to either experimental or control groups. At KCGH there were 53 patients in the Nurse Clinic and 86 patients in the control group.

Instruments.—A structured questionnaire was used to interview patients. The instrument was designed with help of consultants in sociology and social psychology (Dr. Rodney Coe and Dr. George Psthos of Washington University, St. Louis). The questionnaire, pretested on over 300 ambulatory patients, obtained information on socioeconomic background, illness behavior patterns, frequency of use of medical resources, family, and history of disease. Likert scale items were included to probe attitudes toward physicians and nurses. Two indices were constructed on the basis of responses to these items, indicating a favorable opinion of either doctors or nurses in general. Patients were also asked to specify whom they preferred to do 10 procedures or functions for them. At KU, all patients were interviewed in their home after the study by a research assistant to determine some of their reactions to the provision of care by nurse (appendix D with interview guide not included in report). In home interviews with patients from KU, patients were asked if they knew what was wrong with them. "A series of questions was asked regarding the extent to which patients knew (1) the kind of diet they were on, (2) the reason for the diet, and (3) the foods they could and could not eat."

"As part of the original interview schedule all patients were asked to rate five sources of health information in order of their importance to the patient." They were also asked what they liked most about the Nurse Clinic and were asked whom (physicians or nurses) they prefered to perform certain functions associated with patient care. All patients were asked before and after the study about the frequency of a variety of complaints and their behavior. Answers were expressed as two "indices" the reliability of which was demonstrated in pretesting on over 300 ambulatory patients. (Not explained in any detail.)

All patients completed a standard Minnesota Multiphasic Personality Inventory in order to describe those assigned to the experimental group and subsequently rejected this form of care.

Specific objectives for medical and nursing care were written by the physician and nurse responsible for each clinic prior to the randomization of the patient population.

To probe some of the feelings of patients regarding the institutional setting, clinic, physicians, and nurses, a series of photographs was taken of the clinic waiting room, a doctor, and a nurse engaged in providing care in the outpatient department. Drawings from these photographs were used in probing patient feelings. The questions used are listed in appendix C, which is not included in this report.

Time and motion studies were conducted on a random sample of all patient visits at KU to determine the relative amount of time spent in waiting, in clerical functions, and with the physician or a nurse. The nurses kept track of the duration of the visits.

At KU a television camera was installed in the nurses' office. A random sample was taken of those interactions that the nurse tape-recorded at KU. The original means prepared for establishing validity was for a panel of external observers to review the tapes. It proved impossible to collect a sufficient number of volunteers or paid professionals who would listen to and observe the recordings made. "The transcriptions of the interviews were subsequently analyzed according to Bales' Interaction Process in an attempt to estimate the compliance of patients."

In order to evaluate some of the emotional responses of the nurse, both nurses kept a diary in which they described their own reactions to the experiment as well as ancedotal documentation of the reactions of physicians and nurses. Direct quotations were included.

A physician not associated with the project reviewed all of the medical records at the end of 1 year to determine the numbers of specific types of physical examinations, lab tests, X-rays, consultation, and immunizations. Charts were reviewed at the end of 1 year to evaluate the outcome of medical care in terms of death, progression of disease, and levels of disability.

At KCGH, the nurse completed critical medical event records over a 9-month period. She completed one of the cards each time the question about patient management arose in her mind. "The card specified the reason for the concern, the way the contact was made, what the physician did, and the final disposition of the patient." Three hundred sixty-three nurse-patient interactions were recorded on 253 cards. Both nurses identified their "critical activities" independently showing a less than 3 percent variation between their responses in each category. There was no opportunity to measure the reliability of the critical medical care events since this was accomplished in only one clinic.

The study of Sanazaro and Williamson provided a means of comparing, on an "activity" basis, the nurses' functions with those of internists. The activities defined were based on the results of a national sample of internists' description of physicians' actions that affected outcomes of patient care. Inductively classified were 2,589 critical incidents.

All patients were interviewed prior to random allocation into the experimental and control groups. (It is not clear whether all patients in both hospitals were interviewed or only those at KU.)

Prior to the initiation of nurse clinic activities, every patient in the experimental group was seen by the physician and the nurse together. The patient was told he was part of a project designed to examine better ways of providing care for clinic patients. The patient was also told that he would be seen in the future primarily by the nurse.

The two nurses described their activities retrospectively by using the classification of physician performance developed by Sanazaro and Williamson. This was done for five visits of each of the patients seen by the clinic nurse.

Crude costs of care for the experimental and control groups in the two hospitals were summarized on basis of duration of visits, number of visits, costs of tests, and actual cost of inpatient care.

Findings.—The frequency with which physicians in the national study cited certain activities essential to patient care was compared with the 1,679 essential activities described retrospectively by the nurses. The results showed that the physicians emphasized the diagnostic and technical aspects of care, the nurse emphasized a more supportive role, emphasizing the sociopsychological aspects.

In comparing the charts of both groups at KU, fewer nurse clinic patients had examinations of eyes, ears, abdomen, and lungs. Three times as many nurse clinic patients had pelvic and rectal examinations by physicians on referral from nurse.

Of 253 cards representing critical events (question about patient management), the physician was not contacted on 53 occasions. On 201 occasions, attempt was made to contact physician; 77 percent of these contacts were made during the time the patient was in the office. The type of response of the physician is listed.

The time and motion studies on 33 control patients and 33 clinic patients summarized the relative amount of time spent with clerical personnel, in waiting, and with nurse or physician. There was a progressive decrease in the amount of time the nurses spent with the patient.

There was one death during the year of observation of 86 experimental patients in the two nurse clinics. There were three deaths during the same period among control patients.

"While only subjective estimates of the severity of the disease processes were made there was no indication that during the period of experimentation there had been any significant increase in the severity of the disease processes present in any of the patients."

"There was a significant ($P<0.05$) increase in the return to employment—both full and part time (expressed as full-time equivalent employment) among the experimental group patients when contrasted with the controls."

There was a significant reduction in the frequency of complaints at the 0.02 level of probability for the experimental group. There was a significant reduction in the illness behavior indicating a decreased tendency to consult physicians among patients being seen in the experimental group at the KU nurse clinic. There was no significant difference at KCGH.

The number of visits to doctors outside the clinics was significantly decreased in the experimental group at KU but not at KCGH.

Responses to the question about knowledge of their disease showed that the experimental group's knowledge was greater than the experimental group at the 0.05 level.

All but four of the experimental patients received some kind of dietary restriction. The discussion of medical problems with the family was significantly ($P<0.01$) higher in the experimental group.

There was a reduction in hospitalization in the experimental patients at KCGH but an increase in hospitalization at KU.

At KU, the cost of care in the outpatient area for the nurse clinic group was almost twice that of the control group. At KCGH the cost of care for the control group was greater. The costs of inpatient care for the experimental group are twice that of the regular medical clinic.

There was no significant change in the mean scores of any group on the pro-doctor or pro-nurse scale. Results of retesting the patients of the control group on who should perform certain functions showed no change from the pretest. Retesting the experimental group showed changes toward having a nurse perform certain activities.

Using the projective tests, there was a significant reduction in the expressions of negative attitudes among nurse clinic patients at KU and an increase in number of patients expressing negative attitudes toward clinic among experimental group at KCGH. There was little change in responses in the second projective test except that the control group at KCGH showed a decrease in frequency with which the situation was depressing. With projective test 4, the percentage of experimental patients at KCGH that identified the nurse nearly doubled.

Regarding the question of important sources of health information, the nurse was rated last by the experimental group at KU and ranked third by the end of the study. At KCGH nurses rated fourth and moved to first.

"Results from Likert items suggest that patients' orientations towards the nursing profession, in general, did not change despite the rather dramatic shifts in the orientations to individual nurse practitioners."

The negative reactions from nursing personnel, as supported by the diary account kept by the clinic nurses, was totally unexpected. While problems regarding physicians' delegation of patient care were anticipated, the magnitude of the problem was not appreciated.

Comments.—Further expansion of this type of program will be dependent upon developing an interprofessional relationship between physicians and nurses.

During the writing of objectives for patient care by both the physician and nurse, it was apparent that only when patient centered objectives were considered was there any distinction between medicine and nursing.

The most distinguishing characteristic of care described in this study is the sanctioning of delegation of responsibility, not tasks, by the physician to the nurse.

Critique

With the great demand for health care and because of the sharp criticism heaped upon health care delivery systems, it is fitting that new or expanded roles for nurses be introduced. These new roles will affect staffing. It is wise to test the effect of any change. The research by Lewis is an attempt to do just that. The study is only indirectly related to the question of nurse-staffing methodology. However, since it is suggestive of ways of measuring effect of a new role and ways of studying nurse activity, the research report merits more than a cursory examination.

Lewis' study contains exciting ideas in spite of its limitations. Granted, the research itself lacks an extensive theoretical framework. Furthermore, the investigator was also unable to carry through on his plans for reliability and validity testing of instruments. The critical incident technique used is limited by sample size of individuals writing incidents. But recognizing these shortcomings of the study, the idea of examining critical reports in relation to the Sanazaro and Williamson study is worthwhile. Is it possible to examine nursing practice in some other way than that usually proposed by categories of tasks, which omits the evaluation and treatment objective? And is it possible to reexamine the attitude of patients toward their management in a different way?

The research by Lewis suggests a new approach. The criticism of many nursing activity studies is that, although the nursing activity can be performed by a lesser trained individual, the underlying objective to be achieved in its performance or the constraints placed upon staff may be of such nature that use of a more highly trained person is warranted. No studies have been made to ascertain the variables operating to influence this decision or the proportion of times when such a choice takes place. Yet, if this knowledge were available, it could be helpful in predicting mix of staff.

A42. Lyons, Thomas Francis. "Nursing Attitudes and Turnover: The Relation of Social-Psychological Variables to Turnover, Propensity to Leave, and Absenteeism Among Hospital Staff Nurses." Industrial Relations Center, Iowa State University, Ames, Iowa, 1968.

Review

Purpose.—The purpose of this study was to explore certain organizational and individual correlates of registered nurses' turnover, propensity to leave, and absenteeism. Three major hyoptheses were proposed:

Hypotheses.—

(a) Nurses' withdrawal from hospitals would be related to the affective states of overload tension and to those of satisfaction, with the job, the hospital, and with the immediate superior.

(b) Certain aspects of perceived role clarity would relate both to the affective states of the nurses and to their withdrawal. The concept of role clarity was defined by items about • rules and regulations affecting the job, • limits of authority of the staff nurse; • methods of doing their work, and • supervisory evaluation.

(c) Organizational communication and programed coordination will relate to nurses' role clarity, affective states, and withdrawal.

Other hypotheses, which were contingent upon these, were developed and tested.

Method, procedure, and instruments.—The sample consisted of two subsamples. One was drawn from 10 of the 41 hospitals studied in 1962–63 by the Survey Research Center, University of Michigan. These hospitals had been in the representative sample of hospitals drawn from the National study and were voluntary, general, short stay hospitals, and 300–499 bed size. Approximately 15 general staff nurses in each had responded to a questionnaire. There was a total of 149 nurses in this national sample. The second sample, providing an intensive sample, was in one hospital with similar characteristics. The total nurse population was 217 nurses. Of these 35 had left prior to the time the study was conducted. Forty-nine left after the administration of the questionnaire and 133 remained.

The design of the study was correlational, before and after, design with provisions for multiple criteria and statistical controls. Two levels of analysis were made: one at the individual nurse level and another at the organizational level. Several problems of design were recognized: the direction of relationship, controls, and factor of time. Through the use of partial correlation, the following variables of the nurse population were controlled: age, number of children, tenure, employment status, salary, and education. Turnover was classified as voluntary and nonvoluntary.

Various statistics were used. Assumptions were stated underlying the application of each: Pearson product-moment correlation, Kruskal-Goodman r, and chi square. One-tailed tests of significance were used for these hypotheses in which predicted direction was indicated; two-tailed tests were used for the demographic control variables.

The individual analysis was made on responses to a questionnaire, which included attitudinal items and demographic items. The questionnaire given to the national sample of nurses included 130 items of which 20 were used in this study. The questionnaire administered to the intensive sample was made up of 28 items, 19 of which were the same as those for the national sample groups. One additional item was equivalent but the wording differed slightly. In the report of the findings, great care was taken to make distinct which data were used in the comparison. No information is given about the reliability or validity of the questionnaire.

The variables were defined. The dependent variables were five: • total turnover, • voluntary turnover, • nonvoluntary turnover, • propensity to leave, and • absence (for intensive sample only). The independent and interviewing variables were of three kinds: affective states, role clarity measures, and organizational measures. The first kind was defined operationally as overload tension and satisfactions by specific items in the questionnaire. Likewise, for the second, role clarity measures were operationally defined by specific questionnaire items dealing with role performance clarity and with role evaluation clarity. The two organizational measures were communication and programed coordination, likewise defined by questionnaire items.

Findings.—The findings are reported at length on the basis of the particular sample population and level of analysis. Only a limited number are given in this review.

The predictions of relationships between the affective, cognitive (role clarity measures), and organizational measures were confirmed when the measures of the latter two did not refer to the immediate superior (the first line supervisor, such as the head nurse). These measures, having the immediate supervisor as the direct referrant, were not significantly related to voluntary turnover.

Affective variables were more highly and more frequently related to voluntary turnover than were role clarity or organizational variables.

There was confirmation that cognitive clarity would relate to satisfactions. There was little support for cognitive clarity relating to the more specific overload tensions.

Communication and coordination were also related to overload tension, particularly for the nurses who remained in the hospital.

In both the intensive sample and national sample, in the individual analysis, unreasonable pressure was related to propensity to leave in both groups. In the intensive sample it was related positively to total and pre-questionnaire voluntary turnover.

The feeling that "you can't finish an ordinary workday" and "that the amount of work interferes with how well it gets done," two other measures of overload tension, was not related to nonvoluntary turnover nor to the propensity to leave of the stayers. Only the feeling of "not being able to finish" was related to the propensity to leave of the turnovers and stayers together. Absences were not related to either feeling. In fact, if two-tailed tests had been used, there would have been a tendency for absence to be *negatively* related to the feeling "you can't finish."

Critique

This problem is an extremely relevant one to the question of staffing. The belief that "more staff contributes to greater satisfaction and that stability of staffing will occur with more staff" does exist. As the author points out, the manpower problem warrants examination of the forces keeping the nurse in the hospital setting and those which drive her out.

The methodology is thoughtfully and logically developed. Concepts are described both in theoretical terms and drawing upon research in the field. They are then carefully defined operationally. Assumptions are given for statistical testing. The items in the questionnaire are given. However, no explanation of the origin (other than the National Study and reference to it) is provided. Reliability and validity are omitted. No examination of response to specific items for distribution, etc., is made. However, the levels of analysis used for the data are carefully described.

The analysis is lengthy and detailed in its wording. It is carefully given so that the reader understands exactly which group is being referred to in the discussion. The interpretation appears sound, with the exception that facets of nurse behavior are overlooked in dealing with the questions of overload pressure, unfinished work, and lack of standards.

The knowledge base for the study is exceptionally well developed. Great care is taken to develop the framework for the study. The state of knowledge in the subject field upon which the study rests is well described.

The author painstakingly describes the limitations of the study and modestly gives its contributions. It does provide more knowledge about the relationship of nurse behavior and the correlates of turnover, propensity, and absences. It suggests many ideas for further study. Although some of the findings are inconclusive, it provides direction for more research.

The investigation has been reported in *Hospitals*, October 16, 1970, Vol. 44.

A43. McKenna, J.V. "The Service Manager System: Nurse Efficacy and Cost." (NU 00170 –01/02/03), Progress Reports, September 1967 and September 1968, St. Louis University, St. Louis, Missouri.

Report, September 1967

Review

This report concerns the progress made and problems encountered during the second year of study on the research project "The Service Manager System: Nurse Efficacy and Cost." The period of time is June 1, 1966 to May 31, 1967.

Purpose.—The study, conducted on two surgical and two medical units at Barnes Hospital, is intended to evaluate the Service Manager System by comparing it with the traditionally managed nursing units, with regard to (a) activities of all personnel on the unit, (b) patient care, and (c) cost.

Due to world and national situations affecting available manpower, materials, and financial resources at this time, revisions in research methodology were required. Modifications were proposed and instituted that allowed the objectives to remain as originally outlined. These modifications in research methodology were:

- division of the year into three research periods. The study was continued during two research periods when staffing was high, September 1, 1966 to January 31, 1967 and February 1, 1967 to May 31, 1967. From June 1, 1966 to August 31, 1966, a low staffing period, the Research Group concentrated effort on the development of organizational modifications and staff reorientation to the project.
- a formula was developed by the research group for comparing staff-to-patient ratios between experimental and control floors, a necessity in order to obtain data that reflected a valid index of patient welfare.

Although the research group felt that the expansion of the service manager units should be held in abeyance, the review committee felt it would be a useful move. Expansion of the service manager unit, 10,200, to include the adjacent unit, 10,100, was carried out. This arrangement proved unsatisfactory and costly in terms of data collection and time. After 6 months, the two units were restored to their original states. Data collected during this time could not be used.

The other serious problem encountered during the year was staffing. The rate of turnover among nurses and service personnel was not unusual but posed a major problem because the people were not easily replaced and then, when replaced, required time to become oriented and develop a cooperative working relationship between nursing and service group.

Other difficulties encountered during the study period concerned hospital changes that could introduce new and significant variables into the research situation. A respiratory ICU was set up on the traditionally managed 9,260. The comparable service manager managed unit, 10,200, had an ICU of a less specialized kind.

The classification system for area and level activities described in the first year progress report was used without modification.

A Fortran Program to calculate activity per level and area was developed to transform raw data to percentages on which statistical tests could be readily performed. This program is included in the appendix.

In the previous progress report, random versus equal time interval observations were discussed at length. Experiments and analysis of additional data using a Kolmogorov-Smirnov Two Sample Independent Test applied to the percentage of nursing activities per level and the percentage of activities per area led to the following conclusions:

- nursing activities do not follow a pattern that invalidates reading taken at 15-minute intervals; and
- observations of charge nurses and team leaders at 15-minute equal time intervals are equivalent to random observations with consequent economy of the observer's time.

Method.—Activity studies were conducted on the four research floors April through August 1966, October through December, 1966, and January through May 1967. The area and level activities of charge nurses and team leaders on the service managed medical and surgical floors were compared to the area and level activities of the charge nurses and team leaders, respectively, of the traditionally organized medical and surgical floors. The Kolmogorov-Smirnov Two Sample Independent Test was used to analyze the data.

Both level and area activity classifications were ranked in relation to the objective of focusing the time of the professional nurse on patient centered nursing activities. The level and area classifications were as follows:

Level Classification	*Area Classification*
nursing	giving care
nursing administration	other direct activities
management, dietary	exchange of information about patient
clerical	indirect care
delivery service, housekeeping	personnel centered
unclassified	environmental supplies and equipment
	other unit activities
	standby
	personal

Cumulative percentages were calculated in the ascending order of the classification ranks. Thus, as hypothesized by the research group, a significant difference as measured by a Kolmogorov-Smirnov Two Sample Independent Test does exist between the cumulative activity percentages on two floors at a specific interval of measurement, the cause of this difference and whether or not it truly reflects a significantly greater percentage of patient centered nursing activities can be ascertained.

Data analysis and conclusions for these three time periods are included in the report with tables appearing in the appendix. The authors proposed that the amount of data collected did limit the conclusions. They continued to support the superiority of the service manager system over the traditionally organized units, although the data did not always indicate this. The instances when the traditionally organized medical unit proved superior to the service manager unit was attributed to the excellent head nurse on the traditionally managed medical unit. It was also noted by the authors that the charge nurse on a service manager medical unit did not like the service manager system, nursing care plans, or team nursing. Therefore, her attitude resulted in significant differences in favor of the traditionally managed units.

Three changes were made in the Patient Welfare Scales. The scales were collapsed to nine scales instead of 11 with some of the scales becoming 6-point scales, others 4-point scales, and one remaining a 5-point scale. (Revised scales appear in the appendix.) All individuals who were involved in the development of the scale believe that the scales now possess, to a useful degree, content and face validity. Attempts to establish reliability proved fruitless.

The (revised) Patient Welfare Scales were used in determining the Average Patient Improvement per Observation. Two experimental units were compared with the traditionally organized units. A Patient Improvement Index was determined that was divided by the number of times the patient was observed. The sum of the patient improvement per observation scores of all patients observed was determined for each floor. This sum was used to determine the average patient improvement per observation for each floor. Conclusions indicated that the average patient improvement per observation was greater on the service managed medical unit than on the corresponding traditionally managed medical unit. The opposite was true for the surgical units, however.

The project staff hypothesized that the service manager system would allow nursing staff, particularly the professional nurse, to spend time on direct patient care. The effects would be apparent in the quality of nursing care delivered and the rapidity with which patients recovered. This premise was under study at the time this report was written. The Patient Welfare Measures was the instrument used to evaluate the patient's rate of recovery.

A Nursing Care Measures instrument was designed by the project staff to determine if care measures for a particular patient with specific needs have been performed. The development of the Nursing Care Measures is described in the report. According to the staff, the quality of nursing care can be measured by response to patient needs expressed in terms of appropriate measures performed or not performed. Nursing measures that should be performed for a patient depend upon the needs of the patient that can be classified according to area, level of nursing care required, and purpose. The same nine area classifications used in the Patient Welfare measures are used in the nursing Care Measures. Level of care classifications are: • full care, • total care-minimal treatments, or partial care, and • minimal care. (Definitions are given in the appendix.) The five purpose classifications are hygienic, therapeutic, comfort and supportive, protective, and communicative and teaching. The instrument used by nurse observers consists of a list of statements describing care measures appropriate for each of the nine areas of patient need and the three levels of care. The purposes of care are defined in the appendix and reflected in the items on the assessment sheet. The nurse observers collect data by observing specific patients who are already classified by the nursing staff according to the level of nursing care they require. The nurse observer then determines what care measures are applicable to the patient and if the measure has been performed.

Content validity of the Nursing Care Measures instrument was established by having a number of authorities in the area of "skilled nursing care" review and evaluate, the proposed statements for the nursing care assessors' check list. Forty-six letters were sent with 61 percent of the replies used in the results. The Nursing Care Measures were revised as data suggested. Reliability testing was being started at the writing of this report.

Little effort was expended by the project staff on cost analysis for the time period covered in the report. Data did indicate that the service management system was costing more than the traditional management by the amount of the service manager's and service aides' salaries. Indirect costs were not analyzed.

Length of stay comparisons, using the "t" test, indicated at the 95 percent level of confidence that the average length of stay for patients on the service managed medical floor was significantly shorter than on the traditionally managed medical units. There was no significant difference for the patients on the surgical floors, although the average length of stay was longer for the patients on the traditionally managed units.

Because of staffing difficulties, variations in patient load and lack of control over the number of private duty nurses, a formula was developed by the research group to give a daily estimate of the nursing staff-to-patient ratios on the floor.

Because of identified uncontrollable factors that affect the staff-to-patient ratio, it was determined that any difference greater than .03 in the staff-to-patient ratio of two floors being compared would render the floors uncomparable for that day.

Critique

The impact of improvements in supporting services and of changes resulting from the introduction of new roles to relieve nursing personnel of functions traditionally carried is assumed to be helpful. Nurses will state that carrying nonnursing functions requires more staff. When workload or tasks, then, are transferred from nursing to another department, one looking logically at the situation would agree that if nursing personnel positions are not reduced, the reallocation of tasks comprises an upgrading of the nursing service to patients.

McKenna is concerned with the effect of the introduction of a new role, the service manager, and with its effect upon cost of services, patient care, and activities of personnel. This progress report describes the attack on the question for a 1-year period. The implementation of the research was handicapped by many problems. In this respect, the research serves as a model to demonstrate the problems encountered in studying the real world.

The progress report describes the development of methods and instruments and includes the data from activity studies conducted during this period. The stage of development of the instruments and the amount of data provided precludes drawing conclusions about research at this stage. However, evidence is presented to indicate that selected features such as operational definitions, sample size, reliability and validity, and appropriate statistical treatment are being carefully considered in the research.

Report, September 1968

Review

Purpose.—This study aims to assess the impact of the service manager system upon nursing units with regard to: (a) activities of the personnel on the unit, (b) the patient care, and (c) the cost. The service manager system is defined by the author as a "hospital-wide organizational structure designed to relieve the nurse of the major functions she ordinarily performs on a traditionally organized nursing unit. It provides, on each nursing unit, a self-sufficient service organization responsible for housekeeping, dietary, and clerical functions. The nurse no longer has to perform, *or even supervise*, these activities."

Setting for the study.—Four nursing units (two medical units and two surgical units), identical in configuration, are used in the study. One of each clinical service is traditionally managed by a nurse; the other is service manager managed. In the latter units, the nurse gives up secretarial, dietary, maintenance, and housekeeping functions. The research plan was to hold the nursing staff, ward secretary, and job descriptions the same in both units. The major differences would be the assignment of a service manager and service aide to the nontraditionally managed units. The service manager was trained by a service management supervisor and reported to her. Problems relating to the research projects, encountered by the service manager, were reported directly to the research project director. Unfortunately, attempts to reduce the nursing staff on the service managed nursing units, so that the number of personnel were the same, was not administratively possible. This fact (the service positions being above the staffing allocation for the traditionally managed units) makes the interpretation of the findings difficult.

Three dependent variables were identified: *Nursing Activity,* defined by work sampling categories, level, and area where performed; *Patient Welfare Scales,* a modification of those proposed in the Iowa Study; and *Quality of Nursing Care,* a variable that was later abandoned because of the difficulty encountered in its definition.

Hypotheses.—Three specific predictions relating to the nursing activity were made. It was predicted that service management would result in all nursing position classifications spending a greater percentage of time on direct nursing care; that at the higher nursing classifications, more time would be spent on planning nursing care; and that the time spent by nursing personnel on nonnursing activities would be greatly decreased.

Methodology.—The precision with which the research was carried out was reduced by practical problems due to staff shortages. As a result, the periods for the work samplings data were converted into two time phases, September 1 to January 31, and February 1 to May 31, discarding the summer.

Tests were conducted to learn if significant differences existed between periodic and random data collection methods. A total of 1,124 observations was collected on the four units, using the two methods, rotating five observers at regular intervals between two observer groups for a 9-day period. Data were collected for an 8-hour period per day, 30 observations per 8-hour period. The results showed no significant difference in observations per level of activity, or by particular category, or by nursing units using random and periodic observations as alternate forms. Correlation coefficients for the level and area of activity and total activities were calculated. These correlations were high (.8492–.9728). The author interpreted the correlations as indicative of high agreement between the types of observations.

The data collected on the effect of service management on patient welfare showed no significant differences among the patients classified by nursing unit. Data were collected on 146 surgical patients and 162 medical patients, fall 1967; 106 surgical patients and 107 medical patients, winter 1968. For each period, the patients were divided approximately equally between both types of management.

The modification of the Patient Welfare Scales of the Iowa Study resulted not only in a rephrasing of the scales but also in a plan for constructing a Patient Improvement Index for each patient.

The "t" test was used to test for significant differences between the two medical populations and also between the two surgical populations for each data period. Furthermore, since some of the assumptions for the "t" test were questionable, two nonparametric tests (the Sign Test and the Wilcoxon Matched Pairs Signed Ranks Test) were also applied. In all tests, no significant differences were found.

An attempt was made to establish interobserver reliability of the observations made on patients by undertaking 100 sets of duplicate readings on 100 patients. The second reading taken on a patient followed the first on him within a few hours. The four observers, who had been trained, were set up in two teams, alternating at random their observations. The percent of agreement between observers on the nine scales ranged from a low of 33 percent on one scale to a high of 80 percent on another.

Findings.—The effects of the service management system on nursing activities were drawn from 47,000 observations made of charge nurses and team leaders from April 1966 to April 1968, on the four research units. The data are reported by various data collection periods, showing the significant changes occurring during each period. The Kolmogorov-Smirnov Two Samples Independent Test statistic was used to test for significant differences. In all, 34 significant differences were found between the activities of charge nurses and team leaders on the research units. Eighteen of the 34 "favored" the service management floors; 16 the traditionally managed units (the author uses the term "favored" as designating a greater percentage of time on activities higher in the ranked order of classifications).

A longitudinal (overtime) placement of these differences, however, indicated that 14 of the differences occurring in the service managed units took place in the last data collection. There was a distinct trend toward fewer significant differences in favor of the traditionally managed nursing units and a greater number of significant differences in favor of the service managed units.

The service management effects on cost were inconclusive because of the lack of precise data.

The research staff was unable to develop any satisfactory instrument for measuring nursing care. Several forms were attempted, drawing up classification of patients by total care, partial care, and self-care levels and by the amount of treatments required. Data were collected using three Nursing Care Measuring Instruments, but the analysis of the data showed that observer differences were overwhelmingly greater than differences between units.

There were no significant differences in length of stay between patients on the two types of management of the nursing units.

The exploration of the data collected through the nursing audit led to the conclusion that it was an inappropriate tool to use to study nursing quality.

Critique

The service manager system has been adopted in many places without a thorough examination of the system, the problems associated with its maintenance, its cost, and its effect. Only in a few instances (for example, at Providence, Rhode Island) has there been an attempt to obtain answers about the impact of unit management.

The methodology is poorly described in the report and the first two reports are not included for review. The methodology appears to be one of a two group design, two clinical service comparisons. The experimental variable is the service manager system, which, unfortunately, was set in *above the regular staffing* on the traditionally operated units. The dependent variables were operationally defined. However, the evidence supporting their reliability and validity is missing. The observer agreement was reported as inconclusive for the use of the Patient Welfare Measures. The Nursing Assessment tool was abandoned. The statistical treatment of the data as it is reported appears satisfactory.

The analysis of data is carefully handled, but some of the data necessary to look at cost was discarded because they were imprecise. The author is cautious in his interpretations and takes care that evidence is presented for the conclusions.

Because of limitations of the research, in particular the handling of the experimental variable and the questionable reliability and validity of data, one cannot place confidence in the conclusions that have been drawn.

A44. McLemore, S. Dale, and Hill, Richard J. *Management-Training Effectiveness, A Study of Nurse Managers.* (GM 10346-01, NU 00065-02, NU 00065-03) Bureau of Business Research, University of Texas, Austin, Texas, August 1965.

Review

Purpose.—To gather reliable information concerning the immediate and long term effects of the Management Skills Training Program on individual trainees and on the organization that they represented.

Assumptions.—

(a) Participants were receptive and well motivated to change their beliefs, attitudes, and behavior patterns.

(b) Teaching procedures were social-scientifically informed and well suited to bring about desired changes in knowledge, attitudes, and skills.

(c) The leadership and organizational climate provided some reinforcement for the things which the participants learned in the program.

Hypotheses.—

(a) Participants in Management Skills Training Program will react favorably to program content and organization.

(b) Participants in Management Skills Training Program will show an increase in knowledge of management practices that are consistent with human relations as a philosophy of management.

(c) Participants in the Management Skills Training Program will show changes in attitudes in a direction consistent with a human relations philosophy of management.

(d) Participants will be judged to have improved in the way they perform their jobs.

(e) The extent to which hospitals achieve goals consistent with a human relations philosophy will be increased in the hospitals participating in the Management Skills Training Program.

The Management Skills Training Program

The Texas League for Nursing decided to institute a 4-year workshop program in management skills to meet the need caused by low ratio of professional nurses, increased population, and skills necessary for directing the nursing care of patients. The objective of the suggested program was twofold: to improve patient care by helping key nursing service personnel to become more aware of responsibilities for planning and evaluating nursing care, for developing the personnel assigned to nursing service, and to provide personnel with tools to carry out these responsibilities more effectively.

The Management Skills Training Program consisted of spaced periods of training and on-the-job application. Approximately 400 participants were involved in each of the three major workshops. Each major workshop consisted of a series of three 5-day workshops and one 3-day followup workshop a year later. The workshop series was held in four different regions in Texas.

Each workshop session was conducted by the director of the training program and regional faculty who were recruited from various institutions. The members of the four regional faculties met jointly for training and planning. These conferences were planned and directed in consultation with the management-training firm, Leadership Resources, Inc., 1025 Connecticut Avenue, Washington, D.C.

Methods of instruction for each workshop session included planning and evaluation of patient care and evaluation of nursing personnel, sources of satisfaction and frustration in supervision, role of the supervisor in developing management skills of subordinates, functions of head nurses, role of the head nurse in patient care, recognition and utilization of teaching opportunities on the job, etc.

The director of the Management Skills Training Program and her staff were present at each regional workshop session.

The questionnaire was the primary tool for gathering data. In each of the 3 years studied, information was gathered at each regional site on Monday morning of Workshop I before training was started. Data were also gathered at the end of each major workshop series.

Criteria for success were participant's satisfaction, knowledge, attitudes and job performance, and end-operational results. The central interest that determined the research procedures employed, types of data gathered, and analyses performed and reported were certain aspects of attitude formation and change and individual and organizational performance change.

Sample.—The participants were selected from the population of professional nurses in the position of head nurse or higher in Texas and in neighboring States. No deliberate effort was made to insure that the nurses selected as participants would be representative of the population.

The characteristics of the faculties and participants are presented. There were 407 participants and 40 faculty members. The faculty members were less likely to be married and were from an older age group than the other participants. The participants typically were head nurses in general hospitals, many from hospitals with fewer than 300 beds. The faculty members were more likely to be drawn from the specialties of public health and nursing service administration. The participants were more likely to have graduated after 1949; the faculty before 1950. A majority of participants and faculty members received their basic nursing education in diploma schools of nursing. The participants of Workshop III were younger than those in Workshop II series. The Workshop III participants were more likely to be employed by a public health agency or an educational program or a hospital of a smaller size. The faculties in the Workshop III were younger than faculties of earlier workshops. The Workshop II faculty members were more likely to have held positions of administrator, director, associate director, or assistant director.

Instruments.—To determine general reaction to the Management Skills Training Program, attendance and satisfaction were measured. The attendance patterns were examined by comparing those who attended all three workshop sessions in a given year with those who attended the first session only and all other attendance patterns. Selected background characteristics (age, marital status, level of authority, employing agency, hospital size, possession of academic degree, years since graduation, and previous participation) were compared.

Questions concerning satisfaction were asked of participants in all three major workshops. "In general, to what degree were you satisfied with this workshop?" "Were there problems discussed during this workshop that were particularly pertinent to situations you face in your job?" "How do you feel about the length of this workship?" "Did one or two members tend to dominate the discussion in your work group?" "Were you able to participate in the discussion of your work group as often as you wanted to?" "How frequently did your work group's discussion seem somewhat trivial?" "In your opinion, how effective was the leadership of your work group?" "As background for the group discussion, how important were the materials presented by the resource person?" Categories of answers were combined and new choices were added in later workshops. Satisfied participants were compared with other participants according to age, marital status, level of authority, type of agency, size of hospital, recency of graduation, and possession of a degree.

Two different tests of human-relations knowledge or information were used. In the first "Human-Relations Application Test," only eight items showed discriminatory power when tested on the participants of Workshop I. The second form was a 26 item test based on publications of Leadership Resources, Inc. Seventeen of these items were used for Workshop III participants. The items were stated as attitudes and the respondent could choose from six categories ranging from strongly agree to strongly disagree.

Each of the four attitude measures was based on previous studies. Democratic leadership orientation was measured by 10 items selected from a scale developed by Riecken. Functional orientation was measured by a 10 item revision of a scale devised by Seeman and Evans. The measurement of willingness to initiate action and of consideration was based upon work of Flushman and his associates. The sources of the original studies and means of revision of these scales are included.

Three types of performance evaluation procedures were used. These were the Veterans Administration Núrses' Performance Study, the Dallas-Fort Worth Performance Study, and the Controlled Case Studies.

Veterans Administration Hospitals' Proficiency Rating System contains 16 job-performance characteristics. Records of performance of 80 nurses in 11 VA Hospitals were compared before and after the training program. Performance ratings could range from 11 to 88.

Like the VA sample, the Dallas-Fort Worth performance sample was not randomly selected. Performance ratings on 45 nurses were made by directors of nursing service prior to the individual's participation in the training program. The performance rating study was carried on in conjunction with a lengthy, confidential interview with each director. The scores on the performance scale ranged from a possible 23 to 207.

Thirty-six groups of four persons comprised the controlled-case-study portion of the performance evaluation. Each of the experimental groups contained a nurse who expected to attend the management skills training program, her immediate superior, and two of her subordinates. The control group consisted of a nurse who did not expect to attend the workshop, her superior, and two subordinates. Before the workshop, interviews were held with selected individuals. The superior filled out forms designed to yield consideration and initiating structures for herself and for the index person. Each index person filled out forms to yield consideration and initiating structures for herself and the extent to which her superior was considerate and initiatory.

Individual and organizational performance changes were based on self-reports and changes in organizational performance. The participants of Workshop II and III were asked the following: "As a result of your participation, have you changed, in any way, the manner in which you perform your job? If yes, please describe the change you have made." The content of each participant's statement about the type of change was analyzed according to a functional model, proposed by Seeman and Evans. The functions related to changes in nurses' activities were supply, service, communication, control, discovery, and teaching. Operational meanings are supplied.

At the end of the final workshop, questionnaires were sent to directors of nursing service of 199 different organizations who participated in the workshop. One hundred eighty-three responses were received and 153 questionnaires were analyzed.

Results.—Data were gathered in relation to several hypotheses. The results are presented according to each hypothesis and include the following: general reactions to the program, knowledge levels and changes, attitude levels and changes, performance evaluation, individual and organizational performance change.

The criteria used to indicate favorable reaction were attendance and degree of satisfaction. Approximately 80 percent of the participants in Workshop Series II and III attended all three workshop sessions. Answers to questions indicated a high, but variable, level of satisfaction as to the entire workshop program. In general, the older, less educated nurses were more fully satisfied.

The mean score of the participants on the human-relations test was higher at the end of the training period than was recorded at the beginning (Workshop II: 4.61 to 4.91 and Workshop III: 4.56 to 5.82. Scores on the test given to Workshop II could range from 0 to 8. Scores on the test given to Workshop III could range from 0 to 17.). Only one region showed a decrease of the mean score. Participants were categorized according to level of authority, hospital size, academic degree, and recency of graduation. This analysis showed no differential information change.

With respect to democratic and functional orientation and initiating structure, significant changes were noted in Workshop II and III. Consideration showed a significant increase in Workshop III, but a decrease in Workshop II. Workshop III appeared to be more successful with respect to attitude change than was Workshop II. The data were examined in terms of region and selected background characteristics. Persistence of attitude change was based on results of attitude tests after the followup workshop. The changes in the democratic and functional orientation and initiating structure were in the predicted direction and in the opposite direction for consideration.

In comparing the total performance scores of the Veterans Proficiency Rating, there was little improvement or negative change. The average variation in performance ratings was greater among the hospital samples than across the time period.

The overall work performance improved in the Dallas-Fort Worth study, but the support was at the lowest level of confidence.

The conclusions of the controlled case studies showed that the social structure of hospital ward work group can impede efforts to increase consideration but permit changes in initiating structure. There was little evidence to show that the index individuals were more likely to change their job behavior than index individuals in the control group.

The data from the self-report of performance change showed the vast majority of the participants reporting they had modified their job behavior in one, two, or several ways.

Changes in organizational performance were reflected in the response of the directors of nursing service. In nine of the 14 types of organizational changes listed in the survey, over 50 percent of the directors reported new practices as a result of workshop participation. Fifty-four percent revealed large improvements in interpersonal relations. Analysis was done of types of organizational change to hospital size and number of participants sent to the Workshop.

Critique

This research study is only indirectly related to nurse staffing. It provides no assistance in design of methodology, but does provide insights into the effectiveness of workshops in bringing about changes in nurse behavior. The use of workshop training relative to planning for staffing has been considered in training staff for methodology or for bringing about changes in attitudes for acceptance of a methodology.

The research is carefully reported and the chapters read well. The research is based upon a strong theoretical base drawn from behavioral sciences. Terms are operationally defined and measurement of change determined by standard tests, by tests modified for use, and by especially constructed measuring devices. These devices are included in the appendix of the report and are readily reproducible. The reliability and validity were reported for some of these but not all. The measuring devices are related to the hypothesis.

The content of the experimental variable (the training program) is very briefly described. The logistics of the sessions, the variations from region to region, the methods employed, and the general themes are given but specific statements of behavioral changes to be achieved by the participants, other than those implied in the hypotheses, are missing. Therefore, it would be impossible to replicate any portion of the experimental variable by using the report of the research itself.

The data obtained from testing are carefully and appropriately analyzed. Tables and figures are clear. The results are sobering. A large amount of time, money, and personnel resources went into the training effort, whatever it was. However, the amount of change in human relations is slight. Change in attitudes was in the right direction on three of the four elements selected. The change in the overall work performance was disappointing.

The value of this study is limited by lack of information about the experimental variable. It does point out that workshops may be vastly overrated in their effectiveness in bringing about certain types of behavioral changes. The report suggests that use of workshop as a device in staffing methodology implementation should be examined very carefully before its adoption.

A45. MacDonell, J. Asa K.; Brown, Unnur; and Johannson, Barbara. "Timing Studies of Nursing Care in Relation to Categories of Hospital Patients." Report of Research Study supported by Canadian Public Health Research Grant, Project No. 606-7-162, Deer Lodge Hospital, Winnipeg, Manitoba, Canada, (no date).

Review

Purpose.—To examine the correlation between numbers and type of staff with severity of the case.

Rationale.—If the severity of the case could be categorized and correlated with the amount of time nurses spend to provide nursing care for the patient, then the numbers required and the type of staff best suited to provide care for a number of patients on a ward might be estimated.

Sample.—The timing observations were carried out on a partial basis in two hospitals and complete basis in four other hospitals. At each hospital nursing administrators and staff were oriented to objectives of project and method of observation.

Definitions.—*Level of care.* Items of nursing care listed on a proforma (appendix I) are assigned weighted scores. When the items of nursing care the patient receives are checked, a level of care can be determined. From such analysis, it has been found that there are three broad classifications of patients designated as Level I, Level II, and Level III. These levels reflect measure of severity in terms of the nursing requirement. The relationship between level of care and the descriptive terms used to classify patients is described: • Level I—investigative, convalescent—minimal amount of nursing care; • Level II—intermediate, extended treatment (long term)—moderate amount of nursing care; and • Level III—acute, intensive—maximal amount of nursing care. Each of the terms used to describe the various types of care in each level is defined. An example of a definition is: Investigative care—care provided to a patient who is in the hospital for investigative procedures. His nursing care is negligible. Dependent nursing care and independent nursing care are also defined.

Level of care proforma: This form for level of care assessment is used as a checklist for certain nursing activities. The procedures are grouped under five major areas, which are clinical monitoring, assessment of technical nursing, assessment of nontechnical (basic) nursing care, physical medicine, and organized psychiatric service. Vital signs, consciousness, and electrical monitoring comprise clinical monitoring. An example is: Vital signs—B/P more frequently than once per hour (30 points), less frequently than once per hour to two times a day (15 points), daily (.5 points); and less than daily (zero points). TPR can be checked under similar groupings, points ranging from 20 to zero. Comatose, semicomatose, and consciousness are the three alternatives to be checked under consciousness and range in point value from 50 to zero. The presence of electric cardiac monitoring and/or rhythm regulation is given a 50 point value. All of the procedures in the proforma are defined in this study.

The method used to assign specific number values to these procedures is not explained, although the hand scoring method of totaling the scores and relating these scores to the level of care is described in detail. So, also, is the data processing method of doing this.

Factors influencing indirect patient care time: The definitions of factors influencing indirect patient care time are included in appendix V. The 18 factors are labeled as bedside, central, accessible, not shared, convenient to use, not convenient to use, available to use, not available to use, simple charting, complex charting, work compatible, and work antagonistic. Examples of definitions include: *bedside*—refers to supplies and equipment that are located in close proximity to a patient; *ready*—refers to supplies and equipment that are available in a form that is ready for immediate use by the nurse; *individual*—refers to supplies and equipment that are for the exclusive use of less than three patients; *not available to use*—refers to supplies and equipment that are not ordered, maintained, and distributed in sufficient quantity on the nursing unit.

Procedure.—Each nursing procedure listed on the Level of Care Proforma was timed to determine the time factor in providing care. All timing observations were carried out by two members of the project team. Previous practice by the two observers reduced variations in their recorded results to the point of least standard deviation. Preliminary statistical assessment indicated that 25 observations of each procedure for each level were required to ensure significance. Limitations included the infrequency with which some procedures were used and the fact that some procedures are not common to all patients. It was sometimes necessary to repeat the timing of the same procedure on the same patient.

The category of nursing personnel was also considered so that consistent staffing patterns of procedures to certain categories of nursing personnel may be identified.

Each procedure has components of direct nursing care and indirect nursing care. *Direct care* begins with the physical and/or psychological contact between the patient and the nurse relating to the procedure under observation and terminates when the contact between the patient and nurse ends. Activity carried out away from the patient, relating to a nursing procedure is indirect care. *Indirect care* consists of preparation, followup, and delays. Any event that prevented the conduct of a procedure was a delay. Each of the direct and indirect components was timed for each of the nursing procedures listed on the Level of Care Proforma for each patient level.

Patients from each of the three levels of care were observed continuously for 24 hours by two observers working alternate 6-hour shifts. The total amount of direct nursing care received by each observed patient was determined. The timing of the indirect nursing care was inferred from the procedure timing study. Some procedures that may have had only a direct nursing care component, not listed on the Proforma, were timed. Eight to 10 patient timing studies for each level were required.

Results.—Regarding the procedure timing study for hospital A, sample homogeneity for each procedure was obtained, statistically, when the data were analyzed. Therefore, an arithmetic mean could be determined for each item. No comparisons of average procedure times were made between Level I and the other two levels because there were too few Level I patients and too few procedures observed on Level I patients. The comparisons between Level II and Level III procedures showed varied results. Eleven procedures were compared. The differences were not representative of a consistent pattern. However in four instances, preparation time was greater in Level II than in Level III and in two instances the followup time was greater in Level II. In comparing Level II and Level III for factors contributing to indirect nursing care time, it appears that supplies and equipment were more favorably located, more accessible, and that charting was simpler for the Level III patient. The majority of Level III patients received their care in an intensive care unit and the Level II patients were cared for in general ward areas.

The times for total, direct, and indirect care for the 24-hour period, and for the three shifts, with the proforma scores for clinical monitoring, technical nursing, and basic nursing are listed for each Level I, II, and III patient studied. The data were averaged, statistically assessed, and the confidence interval has 0.90 probability of containing the true average. A regression analysis of the total, direct, and indirect time versus the scores in clinical monitoring, technical nursing, and nontechnical nursing showed a significant positive relationship between total time and nontechnical score and between direct time and nontechnical score for the Level I patient. A regression analysis of the same factors for the intermediate Level II patient showed a significant and positive relationship between the indirect time and monitoring score and between direct time and the nontechnical score. For the extended Level II patient, regression analysis showed a significant positive relationship between total time, direct time, and the indirect time and the monitoring score. There appeared to be a significant positive relationship between total time, direct time, and the indirect time and the nontechnical score. For the Level III patient (acute and intensive), there appeared to be a significant positive relationship between each of the time components and each of the score components with the exception of the indirect time and nontechnical (basic) score.

The charts and tables used to explain the data collected and analyzed for Hospital A cover the following: • average procedure time—Hospital A —direct and indirect nursing care, • components of procedures—time for indirect nursing care, • average procedure time comparisons between levels, • patient timing study—Level I (time in minutes), • patient timing study—Level II (intermediate) (time in minutes), • patient timing study—Level II (extended) (time in minutes), • patient timing study—Level III (acute and intensive) (time in minutes), • average time for total, direct and indirect care in minutes for Level I, Level II, and Level III patients in Hospital A for day, evening, and night shifts, • factors influencing indirect nursing care time, • ratio relationships between average direct and indirect times for each of the three shifts for Level I patients, • regression analysis of time versus scores for Level I patients (degree of significance), • ratio relationships between average direct and indirect times for each of the three shifts for Level II (intermediate) patients, • regression analysis of time versus scores for Level II (intermediate) patients (degree of significance), • ratio relationships between average direct and indirect times for each of the three shifts for Level II (extended) patients, • regression analysis of time versus scores for Level II (extended) patients (degree of significance), • ratio relationships between average direct and indirect times for each of the three shifts for Level III (acute and intensive) patients, • regression analysis of times versus scores for Level III (acute and intensive) patients (degree of significance), • average total time, direct, and indirect time for patients timing study for three shifts—Level I patients, • total, direct, and indirect average times for patient timing study for three shifts—Level II (intermediate), • total, direct, and indirect average times for patient timing study for three shifts—Level II (extended) patients, and • total, direct and indirect average times for patient timing study for three shifts—Level III (acute and intensive) patients.

The results for Hospital B are analyzed in a similar manner as for Hospital A. Since no observations were carried out on Level I patients, some tables are omitted or changed. Fourteen procedures were compared for the Level II and III patients.

Discussion.—A discussion of the data from Hospital A and Hospital B reveal detailed implications. Although there is no consistent difference in direct nursing care time or in indirect nursing care time when comparisons between levels are made, there are factors present that have a bearing on the duration of time. Direct nursing care time is administering time and nurse-patient interaction time. The factors influencing administering time is hospital policy, the manner in which nursing work is assigned, the familiarity of the nurse with the procedure, and the anatomical and clinical status of the patient. Nurse-patient interaction time is the care time that immediately precedes and follows the administration time. This time may continue throughout the nursing care contact and varies with the degree of communication that has been established. The identification and application of all facets of direct nursing care requirements represent the area in which strong nursing care plans should be developed. Indirect time consists of preparation time and followup time. The amount of preparation time and followup time is dependent upon whether or not supplies, equipment, and personal care items are immediately accessible, maintained in good working order, ready to use, provided on an individual or shared basis, and adequate in quality.

To determine effectiveness of the work of the nurse (efficiency), direct nursing care (product of the work of the nurse) is divided by indirect nursing care (work cost). Therefore, one way in which efficiency can be increased is by decreasing indirect nursing care time. The difference in favorable location of supplies in one hospital demonstrates that appropriate facility design has the potential of reducing indirect care. Greater attention to facility design, to work methods, to delivery and disposal systems can improve the efficiency of nurses. Since the majority of patients in hospitals are the Level II (intermediate) type, the greatest effect of improved efficiency will be manifest with this group.

Levels of care are considered. Despite the limitations of the small number of patients in Level I, the results show this group did receive the least amount of nursing care time, more of which was provided on the day shift. Considerable amount of time was expended in food service and personal hygiene for this patient. Implications for care of the Level I patient are many and varied. The Level II (intermediate) patient, comprising the largest group in the patient population, ranks second in care time and presents a diversity of nursing care requirements. The care given during the day shift exceeded the sum of care given during the evening and night shifts. This was related toward routine rather than patient-centered plan of care. Since these patients comprise the largest group in a hospital, it is logical to arrange the physical facilities that best serve the needs of the patient and the requirements for efficient nursing work. Patients in the Level II (extended) category rank second in terms of care time, have been in the hospital 35 days or more, and require a considerable degree of personal assistance. Because of the distinct care requirements, it appears that the best way to provide for these requirements is to congregate such patients in purpose–designed areas. The Level III patient was provided the greatest amount of nursing care according to the proforma technical scale. The group in intensive care units did receive more care during the evening and night shifts, relating to the more equal distribution of staff. Numerical values (proforma scores for clinical monitoring, technical nursing care, or basic nursing care) were tested by regression analysis against nursing care time. Formula can be derived expressing this relationship to predict care time from the known score. Assuming that a nurse provides 7 hours of care in an 8-hour shift, the amount of staff needed for each level of patients in the two hospitals is presented. The nursing staff required for the hospital as a whole, or for individual wards, can be derived. Examples of staffing patterns on a daily basis are presented.

Results of a study in Hospital D, a children's care hospital, are presented in a similar manner to the previous study for general care hospitals designated as Hospital A and Hospital B. As in the other two hospitals, there is no consistent difference in direct nursing care time or in indirect nursing care time when comparisons between levels were made. The number of student nurses receiving instruction in this hospital affected the administering time portion of the direct nursing care time. The stage of development of the child and the psychological needs of the child were also factors. In general, the factors contributing to indirect nursing care time were the same as for the other two hospitals. Delays were more frequent in the Children's Hospital.

The Level II (intermediate) patient comprised the largest group in the patient population and ranked lowest in care time. The nurse-patient interaction was a prominent feature of care for the Level II (extended) patient. This feature and the high nontechnical nursing care provided for all levels of patients were two factors that differed for this hospital. On the basis of staffing formulas, numbers of nursing staff required to care for Levels I, II, and III patients (when their numbers are known), on individual wards or in the hospital as a whole and on a daily or annual basis, can readily be derived.

Category of Nursing Staff. An original premise of this project was that the category of nursing staff carrying out a procedure might constitute a time factor. However, the samples for each procedure were not sufficiently homogeneous relating to category of nursing staff to permit statistical analysis. To identify a pattern of assignment of procedures to nonprofessional and professional nursing staff, over 600 procedures from three hospitals were analyzed. A table represents an impression of the prominent distribution of tasks relative to the procedures, level of patient, and the category of staff. The pattern of assignment depends upon hospital policy, availability of staff, and judgment of the head nurse or team leader.

Summary.—This project has analyzed that portion of nursing work that is the nursing time spent relative to the provision of direct and indirect care for each level. The project does not make judgments regarding the quality of nursing care. The time obtained in the observation of nursing procedures was peculiar to the hospital under study.

The selected procedures listed on the Level of Care Proforma are not intended to be comprehensive of all nursing care procedures but rather an indication from which a classification of patient can be made. The amount (time) of nursing care a patient receives accurately indicated the severity of the care. The four levels represent identifiable gradations from the least to the greatest care time. The percentage distribution of patients of different levels in the three hospitals was as follows: Level I, 9 percent to 12 percent; Level II (intermediate), 70 percent to 75 percent; Level II (extended), 5 percent to 10 percent; and Level III (acute and intensive), 10 percent to 15 percent. The level of care method provides a rapid and objective classification of hospital patients and, therefore, is an accurate indication of the patient care load.

Because nursing care times for procedures and levels vary for each hospital, the method of conducting procedure timing studies and patient timing studies must be repeated to derive a staffing pattern. The figure of 1,765 for annual hours of work of a nurse does not include time for inservice education, ward conferences, etc. A method that is a modification of the project design is presented as a guide for staffing patterns.

The emphasis on ward routine-centered care—rather than patient-centered care—is reflected in the distribution of care time between shifts. The plan of ward routine traditionally assigns the greatest number of nursing activities to the day shift, relating to staffing patterns. Emphasis on the needs and requirements of patients may result in the more evenly distributed expenditure of nursing time and staffing pattern. Dependent nursing care, that which is carried out upon instruction by the physician, accounts for the majority of nursing time. At least equal emphasis should be placed on independent plans of nursing care. When staffing patterns are not adequate to meet the nursing care requirements for patients, the nurse makes judgments of what care may be omitted.

Indirect care accounts for a considerable proportion of nursing time, therefore reducing the efficiency of nursing work. Because the Level II intermediate requires the largest group of hospitalized patients, attention should be given to purpose design. Detailed examination of the type of patient, of the demands their number impose, and how purpose-designed areas can improve their care and the efficiency of nursing work is indicated.

Critique

This thoughtfully conceived and carefully carried out study is only partially reported in this publication. The portion concerned with care of chronically ill patients appears in a later volume.

The introduction of the report reviewed the problem of measurement of nursing activity and refers to 11 studies bearing upon the question, including the work by Connor and the Iowa group. The rationale of the study is articulated in explicit terms. Much of the study makes sense. Terms are well defined and are operational. Procedures are clearly stated. There is an excellent description of the timing studies, which included the feature of two observers for each timing both of whom had worked on time studies together previously. It is possible to replicate both the categorization of patient and the time studies. Studies were conducted in a total of six hospitals, three of which are reported in this volume.

Unfortunately, there are voids in the reporting or in the research procedure itself. The method used to assign specific number values to the procedures, comprising the checklist for the Level of Care Proforma, is not described. Neither is there assessment of the instructional needs of patients and procedures related to them. Evaluation of the psychological problems of patients, other than that presented by mental state and consciousness, is missing as is any component of care relative to the psychological aspect. The checklist primarily represents a physiological continuum as does that proposed by Connor. Again, it may be that the care presented in these hospitals reflected a physiological orientation. On the other hand, the description of the direct care and independent function of nursing leads one to believe that the investigators were not unaware of these aspects. The omission of items reflecting procedures relating to the psychological facets of nursing practice from the practice is not explained. This omission is made more apparent by the thoughtful discussion pertaining to the interpretation.

Sample size for data collection on procedures and for continuous timing of patient is small. For timing procedures, the number by level varied from zero (Level I) to 42. The tables depict what was collected. The overall sample size timing for procedures is rationally explained and supports the thesis, in part, that "nursing procedures are related to the severity of the case." The time required for 11 different procedures, when compared, revealed some differences between levels that followed no consistent pattern indicating that, based on this sample size, generalizations about time for specific procedures could not be made. However, the investigators, in searching for variation in amount of time, identified the factors associated with supplies, work, and charting that could be contributing to the variation. Their analysis of the indirect time required was thoughtful and realistic.

Regression analyses were done to examine total nursing time, direct nursing time, and indirect nursing time versus scores in clerical monitoring, technical nursing, and nontechnical nursing for levels of care. Regression analyses formulae are not given. Results are reported only in terms of significance or nonsignificance. The differences in time required by different levels of patients are supported by the evidence.

The discussion of the results, although difficult to read and somewhat repetitious, is detailed and reflective of knowledge about nursing practice.

The proposal for application to hospital and ward staffing is written in simple direct style with examples to clarify points.

One cannot but wish that the scheme included additional facets and that the weighting was explained in the report. There is much in this study that is valuable. The authors speak in logical, rational terms, recognizing variations in practice that result from other sources. They are also modest about their contribution. In spite of limitations, the study pushes farther along the knowledge base required for a rational staffing methodology. It is useful in its suggestions about variables influencing staffing.

A46. Mainguy, J.W.; Smith, K.M.; and Truitt, L.V. "The Reliability and Validity Testing of a Subjective Patient Classification System." Report of Canadian Public Research Grant No. 609-7-197, Vancouver General Hospital, Vancouver 9, B.C., June 1970.

Review

Purpose.—The study has a threefold primary purpose: (a) to test a specific subjective classification tool; (b) to examine the reliability of its application beyond the scope of two hospitals; and (c) to assess its validity as a measure of the nursing care requirements of adult medical and surgical patients.

Hypotheses.—The study was designed in two phases. Phase I was a period of pretesting the tool. Phase II consisted of a larger study directed toward hypotheses testing. Three major hypotheses were stated: Hypothesis I. "There is a difference in the way different categories of nursing personnel from different hospitals classify patients", Hypothesis II. "There is a difference in the way different categories of nursing personnel from different hospitals classify patients", and Hypothesis III. "There is no correlation between classification of a patient using a five category subjective classification scale and a three category objective classification scale." Several supporting hypotheses stated as null hypotheses were drawn from each of these and were related to expectations that would be drawn from use of the scale by the various personnel categorizations, from intrahospital and interhospital differences, and from the use of the scale by differing personnel and its correlation with the Johns Hopkins criteria.

Instruments.—The data were collected by use of three instruments, each so designed that it was scanned by a computer reader and transferred to tape for analysis. The five scale subjective form for classifying the sample patients to be filled out by nursing staff and two objective classification forms filled out by nurse researcher. The latter two instruments were developed from the tool used at Johns Hopkins and from materials provided by CASH. The five scale subjective classification scale had been subjected to reliability testing within one hospital, where it was found that the differences in classification assigned to patients by different categories of nurses were not significant at the .05 level.

Sample.—The sample of patients was derived in the following way: Three hospitals in the study setting were selected for size, accessibility, and interest. One large hospital (1,200 beds), two medium hospitals (300 beds), and two small hospitals (less than 100 beds) were used. Following administrative permission, an adult medical and surgical nursing unit of approximately 35 beds was chosen in each hospital. The conditions set were that the permanent head nurse would remain on duty during the collection period, there would be minimum registered nurse changeover, and no nursing students would be assigned. Each hospital would release two registered nurses as exchange raters, one as a "float nurse" at the time of the study within the hospital, and the other to collect data in another hospital.

Procedure.—The procedure was specific: data were collected over a period of 5 weeks, three consecutive days being devoted to the selected nursing unit of each hospital. On day one, in the morning, all the nursing personnel attended a training program directed toward use of the tool. Patients were then classified five times: the afternoon on the first day and twice on the two succeeding days—morning and early afternoon. The head nurse classified all patients, the registered nurse classified patients assigned to her, one nurse outside the nursing unit of the same hospital and one from another hospital classified all patients on the nursing unit. The first two groups (head nurse and staff nurse) classified the patients as part of their day's functions; the other two performed it as a full-time assignment, using a random order for selecting patients for classification, the order based upon bed numbers and a table of random numbers. During the same data period, the assist nurse researcher collected the objective data using the other two tools.

Analysis.—The data from which analysis for reliability was made were compiled on 697 matched subjects; in other words, two individuals were rating the same patient. Data were organized to provide bivariate tables so that the distribution of classification categories for the same patients was matched by the two categories of nurses being compared. Chi-square statistics were used to test discordance of agreement.

The data were also analyzed by an alternative method that allowed expanding the restriction placed on determination of agreement. Under this analysis, agreement was defined as allowing one degree of the scale difference as agreement.

For the validity testing, the bivariate tables consisted of the ratings of nursing personnel matched with objective classification data on the same patients collected by the assistant nurse researcher. Goodman's gamma test was applied to the data.

Rater consistency was tested by selecting at random 25 nurses who were involved. Twenty-five of the patients they assessed were also selected at random. The objective data collected on these patients served as the basis of a description of their needs. The nurses were asked to rate the patients on the subjective scale from the description provided. This rating was then compared with the original assessment made by the nurse. The Chi-square test was applied.

Findings.—Eight major findings are reported. The exact agreements among the nurses within the same hospital averaged 63.10 percent, but the analysis of disagreements revealed statistical variance. Under the alternative form of analysis; that is, allowing one degree scale difference, the average agreement among all nurse comparisons within the same hospital was 98.22 percent. The exact agreement among all nurse comparisons, in all hospitals, averaged 60.84 percent; under an alternate analysis it was 98.18 percent.

The subjective classification tool is a valid measure of the nursing care need of adult medical-surgical patient as tested in its relationship with the Johns Hopkins tool. The nurses who came in from other hospitals consistently rated patients more ill and the head nurses rated patients higher on more occasions than did the staff nurses. The nurses were found to be consistent in their selection of patient categories when tested later.

Critique

This study pushes along the edge of what we know about the precise determination of the nursing needs of patients. It suggests that there is a core of clinical nursing care common to many patients. The author's review of studies that have been done on the subject of classification schemes is exceedingly well done in an attempt to bring together what is known on the subject. The investigators make adaptations from the materials prepared by CASH and draw upon Connor's work, using the classification tool he developed as a validating instrument for the one they tested.

This research investigation is a test for the reliability of a tool for patient classification in its application in one hospital and then in others. The design is carefully thought out and the research conducted with attention given to sampling, method, and analysis. It is an excellent piece of research, presenting one major weakness. The use of Connor's test for validation can be challenged. However, the problem of validation of a classification system is a great one. The authors have approached it using the one instrument that has received wide use. The scheme they provide could be used in staffing methodology.

A47. Mergen, Francis Carter. "Personnel Utilization in a Flexible Nursing Unit Organization." Upublished Doctoral Dissertation. Department of Industrial and Management Engineering, University of Iowa, Iowa City, Iowa, 1963

Review

Purpose.—To determine the effect of a flexible nursing unit organizational structure on personnel utilization.

Sample.—St. Francis Hospital of Peoria, Illinois, is a 688-bed general short-term hospital. Two medical and two surgical units were chosen for the study setting since they were the only types of unit services in which there was duality. A medical and a surgical unit on the A side were experimental units and the medical and surgical units on the B side were the control units.

Rationale.—The experimental treatment involved changes in organizational structure, redefinition of team member duties, and employment of a flexible staffing process. The changes in organizational structure involved the concentration of authority in the hands of the head nurse, giving her control over a broader group of service elements. This changed the types of tasks permitted by personnel working in the units. Eliminating the arbitrary barriers between nursing service and housekeeping functions permits an integration of what formerly had been exclusively housekeeping and nursing service tasks. Some of the job content would be regarded as optional rather than demanded for each level of employee. The duties listed in each job level would be permitted to be done by all levels above that job category. For example, the practical nurse would be permitted to do all that the general and trained aide should do plus additional tasks.

These experimental changes were intended to permit maximum exploitation of a flexible staffing plan. The identification and measurement of the determinants of nursing unit workload are necessary. A flexible staffing process provides for the daily prediction of the nursing unit workload in terms of the total number of personnel hours required. The process in this study requires a modification in the conventional daily assignment procedure in order to accommodate the fluctuations in workload. A personnel pool was developed to provide such accommodations. The daily adjustment of unit personnel hours could be consistent with the predicted workload. The pool was directly controlled by the nursing supervisor.

Possible sources of variations in this study are fluctuations in the nursing floor team composition, variations in hospital routines in the nursing unit on weekends, individual differences between members of the same job category on different units, individual differences between physicians, differences in floor layout, and differences in patients. These sources of variations and the possible effect on patients are examined.

Method.—The four functionally distinct periods of time in this study consisted of a 3-month prebase period to develop measures for use in investigation, a 3-month base period to measure conditions prior to experimental change, a 2-month training period to train personnel in experimental procedures and conditions, and a 3-month experimental period to measure conditions that existed as a result of experimental change.

Data were gathered by work samplers in the base period who obtained the daily information on personnel activity and obtained input team hours.

Instruments.—The principal measure used to weigh the experimental evidence of the investigation includes the patient load index to compute nursing team work output. The quantity of personnel work output was measured, and the process used for analyzing nursing personnel work patterns and work attitudes is presented.

Connor's approach in measuring direct care was used as a model for this investigation. The changes made involved the details of the procedure for classifying patients' illness levels and the daily timespan over which the direct patient care time values were established. Patient selection was made at random with respect to room location, illness ranking, and sex. Collection of patient care event time data was restricted to 6 a.m. to 12 midnight Monday through Friday. Continuous observation of the patient using a stopwatch was selected as the means to obtain the necessary information. An observer was stationed at a point in the hall from which any direct care service provided a group of patients by a member of the nursing unit staff could be observed and its time measured. The time devoted to direct care was that span of time from which the employee entered the room to that time at which he left. Acts excluded were personal reading, conversation with other employees having nothing to do with the patient, and observation of a demonstration. Each observer, through the use of a multiple stopwatch, could observe seven patients. Each observer identified the general nature of the service rendered, the type of personnel rendering the service, and the time consumed by the act. The observers summarized the data during the period of observation.

A systematic selection method permitted the observations of at least one patient set on each of two hospital units per day. Measurement simplicity was increased by assuming that room location and size did not affect event time. Preliminary data were subjected to analysis of variance tests that showed there was no significant influence on patient care event time estimates by either room location or size. After preliminary information from 90 patients was analyzed, observations were made by shift without regard to location or size of patient's room, and patients were randomly selected with respect to medical condition, location of unit, and sex. The resultant sample size imbalances demanded the use of a specialized analysis of variance techniques for treating the nonorthogonal case. During the last phase of the observation period, the patient sets were so selected as to build an adequate sample size for each of the illness ranking categories for the two nursing shifts. "The ultimate sample size was based on the objective of estimating the mean patient care event time for each illness ranking category with an estimated reliability of 15 percent." The event time observation sample size on all four units was 69, 78, and 48 for the three levels of illness categories on the day shift and 120, 82, and 105 on the evening shift.

An effort was made to establish a student nurse direct patient care value that would be equivalent to that of a permanent staff member. It was felt that the student's educational level could be disregarded since the direct care time was to represent all levels of personnel. Three sets of data (one for each illness rank) were subjected to "t" tests. The average direct patient care event time per patient served by permanent personnel was compared with average direct care event time per patient served by student nurses. The weighted average for the student nurses' direct care time was 45 percent. This value for the student nurses' time was informally validated a year later when it was discovered that it required twice as much of the student nurses' time as of their counterparts' to complete the work.

Four industrial engineering students were trained as observers in the measurement of direct patient care time. All observers were assigned a common set of four patients for a 4-hour period until a maximum departure from the group average was decreased to a plus or minus 1 percent of the mean value. This process involved eight sets of four patients. To test the consistency of observing seven patients, two sets of seven patients were observed for 4 hours by the group of observers. The maximum departure from the mean in this test was less than 1 percent of the mean value.

The most consequential difference between the form used in this study to rank patients' illness and the form developed by Connor at Johns Hopkins lies in the criteria used to measure patient mobility. An analysis of variance, made to test the effect of ambulation responses in the Connor's form, showed that this subcategory did not discriminate significantly between patients who were alike with respect to all other criteria considered. Two of the responses under patient bathing category were eliminated as well as the distinction between bathing locations. In order to determine an accumulation effect of all the factors on the rating form, the responses to the three major categories (up in chair, feeding, and bathing) were listed in all their possible combinations. The 21 combinations were submitted to a panel of three assistant directors of nursing who were asked to rank them in ascending order with respect to time demanded of the nursing staff. Efforts were made to classify the accumulated effects as nearly as possible to those used by Connor. The illness ranking system for the postoperative patient was changed to a system oriented about the relative severity of the surgical procedure performed on the patient. Statistical analysis revealed that the procedure discriminated between the three levels of illness. The head nurse and nursing supervisor were selected to rank all patients on their units. Since the ranker's major source of information about the illness characteristics of a set of patients was the report from a prior shift, one independent observer with long-term head nurse experience ranked the condition of all patients on the four floors for 1 month using a combination of direct observation of the patient and patients or staff interrogation. The results of the illness levels of the rankers and the independent observer were subjected to a two-way analysis of variance list of rankers. There was no significant difference among the rankers at the .05 probability level. The condition of all patients was ranked by the middle of each afternoon and revised the following morning.

The Patient Load Index was derived to measure the work output of nursing unit personnel. "Work output" is the quantity of nursing unit work necessary to meet patients' demands. Assuming that the observed patients were under an acceptable standard of care implies that the measure of work output represents that quantity of work sufficient to maintain acceptable hospital nursing standards. Because of the reliability of the Patient Load Index, the same set of medical characteristics imposes the same work demands on nursing unit personnel.

The assumption that work patterns of nursing unit personnel under conditions of fixed staffing policy are different from work patterns under conditions of flexible staffing policy is examined in detail. A question is isolating those nondirect patient care acts that are actually needed from those that are performed as "busy work." To establish the empirical relationship between personnel work patterns and patient care demands, a work sampling study was made early in the study period. Daily amounts of time that nursing unit personnel spent on repairing and organizing materials and facilities for future operations and cleaning or clerical functions that have accumulated over the past were determined. The total nursing unit production activity time was obtained by multiplying the sum of the percentages of nursing service time allocated to direct and nondirect patient care by the number of personnel assigned on a daily basis. Conclusions were that the Patient Load Index had little significance in changing staff levels and productive time is relatively insensitive to changes in the Patient Load Index.

Examination of the actual behavior of staff size at St. Francis Hospital indicated that there were large daily fluctuations in staff size on each of the four nursing units without accompanying changes in the Patient Load Index. Fluctuations were caused by shortages or surpluses of staff personnel and intermittent large blocks of student time spent on the unit.

To answer the question of the relationship of the Patient Load Index to nursing activity, the ratio of direct patient care work to nursing activity was examined as a function of the ratio of the index divided by the personnel hours worked. Because the proportion of nursing unit service time spent in personal and miscellaneous activities could be expected to remain constant if each individual's workload remains constant (a condition assumed under flexible staffing), the nonproductive element can be isolated from that of total nursing activity. The judgment of the nursing assistant director's panel was that under conditions in which work demands were evenly matched by a sufficient quantity of qualified personnel, changes in the total demand level on the nursing units should not influence the work patterns within total productive activity. The panel felt that the nonproductive activity constituted a minor portion of the total nondirect patient care time and served to cancel each other's effect.

After a method was developed to measure and predict the number of personnel hours to meet the workload, there existed the problem of defining and measuring personnel input hours. Input hours were recorded by worker category to detect changes in the composition of nursing teams between or within units. The nursing unit personnel were divided into professional (registered nurses, graduate nurses, licensed practical nurses, and undergraduate nurses), auxiliary (aides, orderlies, and ward clerks), and students. Input hours of the housekeeping aides were not included in the daily measurement of hours since their assignments remained constant during the entire investigation. Continuous sample observations were made of nursing unit personnel work patterns. The four observers were randomly assigned to the unit from which the tour began. The nursing units recorded total personnel hours representing the net time invested by all nursing unit personnel while assigned to that unit. The observers made a minimum of two observations per hour for each unit and had to account for the time spent in the unit by all nursing service personnel observed. Differences in the observers' measurements and hours on the formal schedule were routinely investigated and usually reconciled.

The purpose of the activity analysis was to examine existing work patterns. A pattern is the proportion of unit personnel time allocated to various types of nursing activities. Seven major activity categories were identified and observed by work sampling. Definitions of these categories are included in the appendix. The procedure used by the observer was to move continuously through the four nursing units. On each cycle the observer would make one observation of each member of the nursing service and housekeeping staff. The average number of cycles per floor was three for the day shift and seven for the evening shift. The initial unit to be observed was randomly chosen. To obtain information about the employees' attitudes about the experiment, a job survey was conducted during the prebase, base, and experimental periods. The method used was the questionnaire employed in a nurse utilization study at the University of Iowa.

Procedure.—Changes in intraunit staff assignments and procedures were made. The supervisor of the experimental units designed an inservice training program for five housekeeping aides. The housekeeping aides were selected for their ability to learn and personality traits necessary to deal with patients. This 2-week training program consisted of daily 1-hour classes in which duties and techniques of simple direct and indirect patient care activities were discussed and demonstrated. Supervised clinical experience was provided. Training sessions for the remainder of the nursing unit personnel dealt with plans for integrating the general aide into the nursing service team. To accommodate the installation of the flexible staffing plan, certain changes had to be made. Through trial and error, it was determined that one trained aide could provide adequate morning care to any combination of patients who totaled an index of 14 (using the 1:2:3 ratio for mild, moderate, or severly ill patients). The head nurse could then geographically group the patients and permit improved organization of the work of nursing service personnel. The integration of the general aides permitted their sharing in early morning services rendered the patient. Scheduling this type of patient care for completion in the early afternoon was adopted, despite protests from traditionalists. It was found that the morning shift personnel could start taking the patients' temperatures and this relieved the afternoon shift of this obligation. The sampling of the critical peaks and valleys of this workload was further aided by the rescheduling of hours-sleep care to 1-hour earlier.

Changes in interunit staff assignments and procedures are the center of the flexible staffing concept and represent a significant revision in organization structure. Past data were examined to determine the minimum staff size in care groups needed for each unit. Buffer personnel remained in their home unit unless needed for allocation. Pool needs were given priority, permitting the experimental units to operate as nearly in accordance with computed requirements. Excesses were permitted if there were last minute changes in the student schedule and a number of student hours made available to the unit. The high turnover of the afternoon charge nurse position made it impossible for unit administration to have confidence in the accuracy of the flexible staffing instrument. It became apparent early in the trial period that the predicted staff level seemed to be under the level which the surgical experimental floor administration felt it possible to operate without endangering the quality of service rendered the patient. The housekeeping aides were not included in the computations of predicted nursing service hour needs.

An estimate of the direct patient care event time was reexamined by employing observation measures on 70 patients. These results were compared with the original estimates using the Aspen-Welsch test and showed no significant difference in the values of direct patient care time for any of the three classes of illness on either shift. The results indicate that the basic values used in the Patient Load Index did not change as a result of the experimental treatment. After the experimental changes, patients of the same illness level received the same quantity of direct patient care services as they had previously received. High unit personnel utilization can only be obtained under conditions in which the size of the unit staff rises and falls with demand. To implement the flexible staffing plan, organizational structures and procedures were changed. A personnel pool for the experimental section was created to balance nursing staff supply with demand. The pool was administered by the nursing supervisor of the experimental section or the director of nurses' office. The Personnel Pool Operating Policy is included in the appendix and describes the method of personnel exchange and the criteria of at least two man-hours to make any change.

Analysis.—Two types of tests were used to examine the effect of the experimental treatment. The "U" statistic was employed to determine if the personnel ratio was normally distributed. The average ratios were selectively paired and tested using the "t" statistic and the Aspen-Welsch test. The results of these two sets of statistical tests showed that there is sufficient evidence to conclude that the experimental treatment caused improved personnel utilization on both shifts of the medical experimental floor and on the day shift of the surgical experimental floor. Neither control unit displayed a change in utilization level. Because the only known set of different factors was the experimental treatment, these factors must have caused the increase in productivity. There is no known direct means for computing the change in productivity resulting from intraunit staff flexibility. A conceptual model describing certain quantitative potentials resulting from interunit flexibilities is presented.

In order to further generalize the behavior of the event time values, data were further analyzed. A two-factor analysis technique using a method of weighted squares as suggested by Yates was made for each illness rank to test the event times. There appeared to be a statistically significant correlation between floor and sex on the evening shift of one floor. Because the analysis of variance in the cases of five of the six sets of data indicated no significant difference, it was assumed that the direct patient care event time per shift is a function of illness ranking only. The three illness rank values for each shift were subjected to a "t" test and found to be significantly different. To test the normality of the sample distribution necessary for the use of analysis of variance techniques, the Kolmogorov-Smirnov test was applied to the data. Since the data were discovered to be nonnormal, the effect of nonnormality on the accuracy of analysis of variance was evaluated through an approach suggested by A. K. Gayen, (*O. L. Davis Design and Analysis of Industrial Experiments, 1954*) and D. W. Norton "An Empirical Investigation of the Effects of Nonnormality and Heterogeneity," unpublished doctoral dissertation, State University of Iowa, 1952. The original interpretation appears to be appropriate. The ratio of the average direct care event time to illness rank for data obtained for 6 a.m. to midnight was 1:2.1:4.9.

The work patterns of nursing unit personnel were examined to provide insights into factors accompanying improvement in productivity and to evaluate the effects of the experimental treatment on the quality of care (quality of care is the proportion of nursing personnel time spent on direct patient care). The noncentral chi-square test was used to test for this effect on the aggregate work pattern of all activity categories. The results of the chi-square tests were similar to the results of the personnel utilization tests. The work pattern behavior of the individual job categories is included in the appendix. The binomial model was applied to direct patient care, indirect patient care, and personal and miscellaneous categories. The comparisons confirmed the judgment that shifts in these categories occurred as a result of the experimental treatment.

The results of three sets of job attitude surveys were examined using the analysis of variance procedure suggested by Yates. The results of this analysis indicate that the experimental treatment had no effect upon the aggregate attitudes between units or between surveys.

The author expressed the view that based on statistical analysis, the two experimental nursing units experienced significant improvements. The surgical experimental unit showed a greater increase than the medical experimental unit on the day shift whereas the relationship was reversed on the evening shift.

Uncontrollable factors that could have contributed to the degree of personnel utilization included a difference in personnel utilization prior to the experimental changes, the differences in staff composition due to variation in surgical floor. There may have been an increase in the proportion of total team time devoted to this category of work.

The job attitude survey administered before and after experimental changes indicated no significant changes in the attitudes of nursing personnel toward their work.

The criteria selected for measuring quality of care from the point of view of nursing personnel were that proportion of time spent on direct patient care. As a result of observing the data, there are no substantial changes in the total amount of direct patient care as a result of the experimental treatment.

The results of the experimental treatment are summarized as follows: (a) nursing personnel utilization improved; (b) nursing personnel work patterns changed, (c) nursing personnel job satisfaction remained the same.

Apparent benefits from the experimental changes are summarized. Personnel utilization improved. Interunit standardization of different types of many administrative practices and nursing procedures occurred. The consolidation of authority on one particular unit permits a natural progress of personnel development within the team. The work measurement tool permits more precise standards of performance and control. Fewer opportunities for potential conflict-causing incidents occur within a unit under one authority.

Critique

The purpose of this study, to determine the effect of flexible nursing unit organization on personnel utilization, is of obvious interest to a review of nurse staffing methodologies. This doctoral dissertation is voluminous and the author has described its experimental treatment, measures, and results in detail.

To determine the effect of flexible nursing unit organization structure, two nursing units were subjected to an experimental treatment that involved concentrating ultimate authority over all unit personnel in the unit head nurse. This concentration of authority permitted a revision of unit organization structure, redefinition of unit team members' duties, and employment of a flexible staffing plan.

The two experimental units consisted of one medical and one surgical nursing unit supervised by one supervisor as were the two control units (one medical and one surgical). The rationale as to the basis of the division of supervisors is not discussed nor is this inherent difference considered in the selection of these units. The effect of difference in numbers of patients, types or rooms, and existing staffing patterns is not clearly presented.

Due to shorter lines of communication and control, the change to authority concentration was to permit more effective response to patient care needs. Expanding the variety of duties that auxiliary unit team members were to perform was expected to contribute to improvement in utilization of all personnel because of decreasing specialization. Greater individual versatility of unit personnel reduces the amplitude of variations in work demands, permitting greater stabilization of the nursing workload. Existing literature is not used to substantiate these assumptions.

An instrument for measuring nursing work requirements was based on the amounts of direct patient care given to patients. Direct care was that time from which an employee entered the room to that time at which he left. Some activities, such as personal reading and conversation with other employees, were excluded from direct care activities. The specific activities included under direct care are not mentioned. The observers were nonnurses and observed a maximum of seven patients at one period of observation. The observers' reliability was checked but the substance of the observation was not adequately validated.

The complexity of implementing organizational change is reflected in this study. The author has alluded to and attempted to control many of the variables inherent in such a situation. However, the model was deficient in isolating and defining pertinent variables to be considered, such as communication, centralization, and other characteristics of organizations.

The study is meticulously developed. Data are submitted to rigorous and appropriate statistical testing. However, some of the assumptions underlying the operational definitions are open to challenge.

There are ideas valuable to nurse staffing in this study: the concept of the use of personal and miscellaneous activity as a reflection of workload fluctuation, the concept of reduced specialization in the nonprofessional categories of personnel, the effect of concentration of authority, the nondiscrimination value of ambulation, the discrimination value of the severity of the surgical procedure, and the insensitivity of productive time to changes in patient load. Findings regarding these merit further study.

A48. Miller, Stephen J., and Bryant, W.D. *A Division of Nursing Labor Experiments in Staffing a Municipal Hospital.* USPHS GN-8079 and NU-00038, Kansas City, Missouri: Community Studies, Inc., 1965.

Review

Purpose.—The purpose of the study was to determine the effect, if any, of minimal staffing (2 hours or less HNC/P) on the activity of various combinations of nursing personnel.

Method.—Location of the Study was the Kansas City General Hospital and Medical Center, Kansas City, Missouri, a 400-bed municipal facility. Medical and surgical wards were used. Three levels of personnel—RN's, LPN's, and aides were involved. Twelve experimental staffing situations were tried using the following variables: • before and after inservice education, • typical vs. atypical staff, and • four variations in levels of personnel. The four variations in staffing are depicted as follows: • registered nurses, one, licensed practical nurse, one, and aides, one, • registered nurses, one, licensed practical nurses, two, and aides, zero, • registered nurses, two, licensed practical nurses, one, and aides, zero, and • registered nurses, three, licensed practical nurses, zero, and aides, zero.

The measure of performance was the number of nursing tasks accomplished. Data collection utilized: • the clerical systems of the unit, • the clerical systems of the hospital, • a checklist activity questionnaire, • a summary of activities dictated by each nursing staff member, • random observation by registered nurse observers (three registered nurses used), • and random observations by research staff two (15 minute) periods/hour. The statistical test of significance was the analysis of variance.

Findings.—Regardless of the staffing pattern, nursing personnel performed approximately the same type of nursing tasks and at the same frequency of performance. The staffing pattern that consistently omitted more of the required nursing tasks was the 1-1-1 pattern. In every experimental situation, the staff composed of 2-1-x completed more of the nursing tasks required.

The *quality* of nursing activity, as determined by RN observers, is directly related to the combination of nursing personnel employed (i.e., increased number of registered nurses equals increased quality) and the type of nursing employee (atypical staff equals highest quality of all combinations in complex tasks). Increased utilization of licensed practical nurses was found to make the greatest single difference in the quality of care. *Inservice* had a discernible effect on the distribution of task activity (i.e., increased performance of tasks appropriate to the level of personnel). Greater changes were found in licensed practical nurse and aide level than for registered nurses. No significant reduction in rate of omissions was found. Employment of *atypical staff* (registered nurse, licensed practical nurse, and aide specifically selected because of training, preparation, and experience—cost (increased) showed the registered nurse and the licensed practical nurse are "more likely to engage in activity which brought them into contact with the patient." Also, the authors state that "there is a tendency for them (registered nurses) to engage in nursing tasks related to the particular care needs of patients—these tasks were those requiring judgment and initiative." The atypical orderly still took primary responsibility for basic care, but he engaged also in activity usually thought of as requiring a higher personnel level. No significant difference was found, but atypical staffs were more likely to omit a nursing task when the situation appeared to warrant such action. Little improvement was found in communication, charting, reporting, or administration by use of atypical staff. There was only marginal advantage (quality) of atypical 3-x-x over typical 3-x-x pattern.

Conclusions.—The implication is that though different types of staffs and levels of personnel could be employed, the tasks performed, nursing activity engaged in and, therefore, the care provided would not differ greatly. The critical variables were adequate professional supervision and sufficient ancillary personnel to assure a range of possible nursing activities. A staff with three registered nurses did not differ sufficiently to suggest benefits from employing such a staff.

Critique

The problem is highly significant. It is concerned with the variables of personnel utilization when the number of nursing care hours per patient is low, that is, below 2 hours of nursing care per patients per day. The methodology involves an experimental design, with observations before and after the introduction of the experimental variable. Unfortunately, the authors include no samples of the tools used, although some descriptive information is in the appendix of the report. The work sampling and methodology used for collecting data regarding nursing activity utilized the standard approach. Data collection periods, though random, were short, only 2 weeks in length. Standard statistical treatment is utilized.

The analysis is thoughtfully and carefully done. Interpretation is cautious. Some inconsistencies exist between broader statements and specific findings (pp. 91 and 97) but these are very few.

An attempt is made to define variables operationally. However, the report does not include samples of the data collection tools so that the reader of the report can examine the data collected specifically against the operational definitions.

No particular theory base is presented. The authors do present a brief review of the issues related to the question of staffing and nursing practice. They draw upon other research relating to the question, both for methodology and for interpretation of their findings. In the defense of not including criteria relating to patient welfare, the investigators include a chapter about the social psychology of hospitalization. In this essay, there is no attempt to draw upon theory sociology dealing with role development and expectation.

Knowledge about the behavior of nursing personnel is increased as a result of this study. When nursing care hours per patient are low (2.0 hours or less) in a setting such as the hospital in which the research was conducted, regardless of staffing pattern, nursing personnel perform approximately the same type of nursing tasks and at the same frequency of performance. This suggests that a group of patients present nursing care requirements, the *ordering of priorities* of which there is agreement among most nurses. Atypical nursing personnel may perform in a slightly different pattern in that they choose to omit a different task. They perform more basic care.

Considerable knowledge about the omissions of tasks is gained: • the rate of omission is inversely related to level of education, skill, and experience; • as the percentage of professional nursing staff increases, the frequency of omissions in nursing care is reduced; and • the omissions in nursing care are likewise reduced when number of hours of care are increased.

The utilization of the licensed practical nurse makes the single greatest difference in quality. For low level of staffing, a combination of registered nurses and licensed practical nurses makes the greatest impact on quality.

The inservice education program, contrary to results reported in other studies, made a difference in tasks performed at the aide level and in the distribution of tasks.

The quality of care is directly related to the combination of personnel employed and type of personnel.

This study is therefore very useful in looking at methodology concerned with staffing of nursing units.

A49. Morgan, Jean A., and Sendberg, Ronald. "A Study of an Extendor Role for Professional Nurses." NU 00052 (formerly GM 09601-01A1). Central Wisconsin Colony and Training School, Madison, Wisconsin, (September 1, 1962-December 31, 1964). (Mimeographed).

Review

This report contains several separate papers and articles. All are related to the study and were supported, at least in part, by NIH research grant funds. The first paper deals with hypotheses, methods, facilities, and early planning. The second paper is a report of the pilot phase. The third paper deals with the activities of the second year of the study and is actually a continuation of the report of the pilot study. The need and opportunity to conduct several supplemental projects became apparent during the 2 years of study. These projects relate to various needs and problems that were encountered. These projects must be considered integral parts of this report.

I. *Preliminary Report*

Purpose.—"This pilot project is studying ways of increasing the effectiveness of the relationship between the professional nurses and hospitalized children." Can the role of the professional nurse be expanded to incorporate some of the specific techniques developed and utilized in off-ward activities by (a) physical therapy, and (b) speech therapy, and thereby increase the effectiveness of the total patient care program?

Method.—Closely matched pairs of mentally retarded children were selected on the basis of diagnosis, etiology, chronological age, mental age, sex, general behavior, and emotional adjustment. A coin toss was used to divide the 18 pairs (36 subjects) into experimental and control groups. The children in the experimental group were all placed on one ward and comprised about ½ of the total population on that ward. The control group were on other wards with similar facilities and environment.

Analysis of variance design enabled an analysis of the source of variation between and within the two groups, between and within the three etiological categories, and in the four areas of development. (These categories are specified but reasons for categories are not explained.)

Preliminary testing was done by the psychologist using the Gessell Developmental Schedule, the physical therapy department using an adaptation of the motor achievement test developed by the Lenox Hill Hospital Cerebral Palsy Preschool Center in New York City, and three speech therapists who adapted the Templin-Darley Articulatory Test. After each subject was tested, prescriptive procedures were furnished by the director of physical medicine and the speech consultants.

Orientation to the project and instruction was accomplished by classroom orientation and instruction and by on-the-ward demonstration and supervision. It was stressed to the nurses that they would have the crucial role in this study.

Purpose of Central Colony, physical facilities, and personnel is explained and described.

II. *Report of the Pilot Phase*

Purpose.—The methods used in the second stage of this project will depend upon the knowledge and skills derived from the initial pilot study. The questions will be the same: (a) Can professional nurses be motivated and educated to give "extendor" nursing care? (b) Does this care make a difference in the growth and development of the severely retarded child? The sample size will be increased and an additional control group will be added.

The "extendor" role is defined as "that role which will include into the regular and routine duty of the professional nurse, selected activities that had heretofore been considered as a function of other medical and paramedical services so that these services are provided to the patient on a continuing basis."

Hypothesis.—The extendor role would result in increased speech and motor development in the patients who received extended nursing care.

Method.—Certain criteria for subject selection were used. Subjects were less than 7 years but at least 2 years old. All levels of retardation were selected. Patients presenting severe nursing problems were not included. Individuals with sight and hearing losses were not included. Individuals with a severe physical handicap were not included. Those patients who were candidates for home care placement were not included. Seventeen pairs of closely matched subjects were selected. Those who received "extendor" nursing care were placed on a single ward. The 17 nursing aides regularly assigned to the experimental ward and the eight registered professional staff nurses most often assigned to this area were orientated to the project and trained.

All of the various staff personnel and consultants who took part in evaluating the subjects also joined in the preparation of the individual prescriptions.

These prescriptions were given the full weight of a doctor's order by the signature of the clinical director and were placed on the foot of each crib. The activity of the nurses in regard to actual treatment is briefly described.

Findings.—Approximately 5 months after the beginning of treatment, all 34 subjects were administered the Barker and England speech therapy instrument and the adaptation of the Rembolt Motor Skills Achievement Test (MSAT). The method of obtaining a score for the Barker and England instrument and the MSAT is explained. An analysis of variance was performed on both the speech and motor development scores. No significant effects were found in the analysis of variance of the speech scores. The treatment ward effect was significant at the .07 level in the analysis of variance of the motor development score yielding the only significant F ratio. The mean for the experimental ward on the MSAT was 140.8 compared with a mean of 110.5 for the control ward.

The analyses of variance of the speech and motor development scores after 5 months' treatment yielded that extended nursing care accelerated the motor development of the experimental patients.

III. *A Study of an Extendor Role for Professional Nurses—Final Summary Report.* (The second year.) Continuation of the Pilot Study Report

Purpose.—Because of the extreme shortage of professional nurses, the working definition of the "extendor role" was modified to read "that role which will include into the usual function of *nursing personnel,* selected medical and paramedical services so that these services are provided to the patient on a continuing basis."

Method.—The question of an effect due to ward rather than experimental treatment resulted in a change to put all subjects on a single ward in the continuing study. The criteria for subject remained nearly the same as those for the pilot study, although the age limit was lowered by 1 year and the degree of retardation was further defined. Matching of the subjects was not attempted during this phase of the study. The subjects were randomly assigned within the three diagnostic categories to either experimental or control groups. The experimental design remained nearly the same.

Nursing aides were selectively assigned to the experiment since the same aides would be caring for children in both the two control groups and one experimental group. Six criteria for this selection are presented. Of the 18 aides that were originally assigned, only nine were working at the conclusion of the study. However, replacements were available from a group of 34 aides that originally met the criteria.

A survey of the nurses who participated in the pilot study showed that the three orientation classes were extremely useful. The policy of rotational assignments necessitated that all of them be generally oriented to the project. This was accomplished through their regular inservice training programs. Aides assigned to the experimental unit met in small groups with the project director to discuss their role in the study. The significance of this study as it relates to them personally was emphasized.

During this study there were several changes in the personnel, including the principal investigator, the project director, research assistants, and the typist.

Preliminary evaluation of the randomly grouped subjects in this second phase of the study consisted of the multi-observational Barker and England Speech Scale and an informal assessment of the motor skills and therapeutic needs of each subject. Prescriptions for the children in the experimental group consisted of specific techniques that were intended to incorporate certain aspects of specialized therapy into the regular ward activities of the aides. The "control" prescriptions were designed neither to add to nor detract from the quality of nursing care routinely provided for *all* the patients at Central Colony. None of the ward personnel were told who or where the "control" subjects were.

Findings.—During the first 2 months after the prescriptions had been placed on the cribs, the nursing personnel oriented, and techniques demonstrated on the ward by the specialists, it was obvious to the project director that the prescriptive techniques were not being carried out routinely, if at all by a majority of the aides. New prescriptions were written to minimize time consuming techniques and to emphasize the most important treatments. It soon became obvious that every child on the ward was actually receiving this specialized treatment. At this time 16 hours per day of housekeeping help were added to the ward and allowed the aides more time to spend with the children.

Each subject was rated on the Motor Skills Achievement Test and the Vineland Social Maturity Scale. No differences between the experimental and control groups approached significance at any reasonable level. Neither was any significant interaction found between or among the three diagnostic categories.

Conclusions.—

- An ongoing ward treatment program carried out by nursing personnel within the daily ward environment appears to be an effective method of supplementing and adding continuity to intensive off-the-ward therapy sessions supervised by paramedical specialists.
- Despite the lack of conclusively statistical evidence, this study demonstrates that nursing aides can be trained and motivated to administer prescribed therapeutic techniques, although in this study they were unable to confine the specialized treatment to the experimental group.
- Modified replications of this study are desirable.

IV. *Supplemental Studies*

Study 1: Factor Analysis of 13 Variables on Retarded Subjects.

The scores of 34 subjects were intercorrelated. The primary purpose of factor analysis is to reduce the number of dependent variables in a manipulative experiment.

Study 2: On-Ward Physical Therapy Program.

Purpose.—Extendor nursing care would be tested for its effectiveness under conditions closely resembling those that would prevail throughout the institution after the research project itself had been completed.

Method.—The subjects were young mentally retarded and physically handicapped children, *all* of whom received daily off-the-ward physical therapy, and *half* of whom would be provided additional physical therapy "followthrough" from the nursing personnel on their respective wards. The two criteria for selection of subjects were (a) participation in daily off-the-ward physical therapy of a rehabilitative, as compared to a prophylactic, nature; and (b) residence in the building that was being used for the Extendor Role Study, but not on the specific ward used for the study. A flip of the coin was used to divide the subjects into the experimental group receiving additional followthrough by the ward nursing personnel and the control group who also received off-the-ward therapy but no followthrough by nursing personnel.

Prescriptions were written in the regular doctor's order book. Each ward and each registered nurse was notified by the director of nurses that an evaluation was being made to determine the type and extent of ward followthrough provided for patients currently participating in physical therapy. An analysis of covariance was done on the post-test scores (Motor Skills Achievement Test), using the pre-test scores as a covariate.

Findings.—The gains in motor skill achievement made by the experimental group were not significantly different from those of the control group. The observations were made over a period of a little less than 4 months.

Study 3: Work Sampling Study of Nurse's Aides

Purpose.—To study the functions of aides so that their work could be organized to allow more time for Extendor Role activities.

Method.—A preliminary 2 day observation study was done in order to compile a listing of various activities the aide engages in. These activities were divided into • physical care of patient, • individualized care of patients, • other aide responsibilities, • nonnursing functions, and • personal time.

The study consisted of a sampling of six full work shifts (three day shifts and three evening shifts). Observations were made at random intervals ranging from 3 to 13 minutes in length. It was noted whether the aide was talking to a patient, to another aide, or was silent at the time of each observation.

Findings.—The aides were spending 11 percent of their time in nonnursing activities. It was felt that too little time was being devoted to toilet training activities, in view of the developmental readiness of many of the children. The low quantity of verbal interaction with patients was also striking.

Shortly after the completion of this study, an ideal opportunity arose to remedy some of the situations. Administration decided to assign additional housekeeping personnel to the patient areas. The research nurse worked closely with the new housekeepers and the housekeeping supervisor to develop a routine which coordinated with that of nursing aides. Changes were successful, both subjectively and objectively. The nonnursing activity of the day aides was reduced by almost two-thirds. More time was spent in physical care of patients. Individualized care of patients almost tripled. There was a general increase in verbal interaction with patients. The supplemental work sampling studies done on the extendor role research unit demonstrated that • work sampling methods can be utilized to evaluate the type of nursing care being given by nursing aides, and to identify possible areas for improvement, • addition of housekeeping persons to the existing ward staff freed a considerable amount of time for the nursing aides, and • this extra time, with guidance, can be utilized effectively to provide more and better patient care.

Critique

Any consideration of nurse staffing must take into account the nature of work the individual will be performing for patients. The preservice education of the worker, the native ability of the individual, and the specific training he has on the job will influence what he can do. Because of the changes occurring in the health care delivery system, it can be predicted that present roles may differ in the future. This research is directed toward examining the enlargement of nursing roles and the effect of its expansion on the behavior of retarded children. Its inclusion in a review of the literature on staffing methodology is justified only on the basis of predicted future changes in the health care delivery system. Staffing methodology must in some way be adaptable and applicable to changes in role design.

The research report is difficult to read. It has been set up as a series of papers and shorter reports loosely put together. Nevertheless, the research itself has a logical growth from one study to another. The sample sizes of subjects are small and the tighter technique of matched pairs was discarded in later studies for randomly assigned groups. Units of measurement of change were selected carefully. In most instances, standardized tests were used. The reliability and validity of these tests are not reported.

In clinical nursing research, the experimental variable, if it is practiced, is frequenty hard to describe and difficult to maintain for consistency and constancy. This is true in Morgan's work. The experimental variable, the services performed by nursing personnel, is described, examples of specific treatments performed by prescription are given; and the orientation and training sessions pictured. Nevertheless, the problem of documenting what was done, and consequently what would have to be repeated in replicating the study, persists. Recognition of this limitation of the study is important.

Many problems were experienced during the conduct of the research, introducing confounding variables as well as some change in plans.

The research, however, has merit. It demonstrates the problems in using role enlargement as a variable. It also is an example of research that may well have to be attempted in a new design of staff. It is disappointing that the theoretical framework of the study is very brief, especially since the research is much needed. It emphasizes the need to consider role functioning in any staffing study.

A50. Neuhauser, Duncan. "Average Length of Stay and Hospital Staffing Ratios." (HM 00476), Center for Health Administration, University of Chicago, Chicago, Illinois, 1968.

Review

Purpose.—This is a technical paper in which the author explores, by the use of statistics, the relationship between average length of hospital stay and the ratio between the number of hospital employees to patient days. He draws upon data from the *Guide Issue* of the *Journal of American Hospital Association,* using the summary tables. Additional data are obtained about Massachusetts Hospitals from two other investigators, O. W. Anderson and Jr. Joel Nedy.

Method.—He is concerned with two variables: (a) average length of stay (ALOS) defined as $\frac{\text{patient days in the time period;}}{\text{admission in the time period}}$ and (b) staffing ratios, defined as the number of employees per 100 patient days.

A large part of his paper is devoted to analysis of factors that explain staffing ratios—the two major ones, in his opinion and supported by analysis, being *complexity of care* and *intensity of care.* He defines complexity of care as being care high in volume and diversity and provides evidence that the greater the complexity of care, the greater the average length of stay. Intensity of care is likewise related to time. The shorter the span of time in which care can be given, the more intensive the care. Intensity, therefore, implies a compressing of services that can be rendered either over a short or long period, the nature and volume remaining the same. In the discussion, the author carefully points out that he is not dealing with matters of quality or implying that ALOS is either caused by or affecting a change in staffing ratios. He states "ALOS and staffing ratios are probably interdependent and both in turn depend upon the style of medical care and hospital management."

The factor of intensity can be expected to change some costs and staffing requirements in some departments and not others. "Those man-hours and costs that vary with intensity (ALOS) will be called 'curative care.' Those man-hours and costs that do not vary with intensity (ALOS) will be called 'domiciliary care.' "

In his statistical treatment of the data, the investigator defines complexity by size of hospital and intensity by ALOS. Controlling for complexity, he demonstrates statistically that cost of "curative" and "domiciliary care" are correlated as expected with costs and man-hours. Likewise, the relationship between staffing ratios and ALOS, holding complexity constant, can be diagramed. Equations are developed to predict the average amount of the staffing if ALOS is known.

In the treatment of both factors, complexity and intensity, the investigator draws upon data about 338 acute voluntary hospitals, fitting them into a linear multiple regression equation. A complexity measure is based on an index of the number of technical and professional employees working in the hospital.

Conclusions.—The author concludes that: "Complexity is closely related to the size of the hospital and intensity is reflected in the reciprocal of the staffing ratio. Intensity is more important in explaining differences in ALOS than is complexity."

The implications from the study, including regional data, are:

- ALOS is related to staffing in curative departments but not in domiciliary departments; and
- Nonsalary expenses increase more rapidly than salary expenses as ALOS becomes shorter.

Critique

This is a highly technical report not directly related to the question. However, it is important in that the writer gives evidence that as average length of stay of patients becomes shorter, holding complexity constant, staffing becomes higher but the number of *employee days per case* becomes less. This may be that more effective use is made of personnel.

A51. New, Peter Kong-Min; Nite, Gladys; and Callahan, Josephine M. *Nursing Service and Patient Care: A Staffing Experiment.* (No. 4644), 724 Railway Exchange Building, Kansas City, Missouri: Community Studies Inc., November 1959.

Review

Location.—Trinity Lutheran Hospital and Research Hospital in Kansas City, Missouri.

Purpose.—Two variables, the ratios of nursing hours of care available to patients and the ratio of graduate nurses to total nursing personnel on the units, were used to answer three questions: • Do the attitudes of the patients and nursing personnel change as we change the ratio of nursing hours of care per patient? • Do the attitudes of the patients and nursing personnel change with the ratios of graduate nurses working on the units? • Is there any change in the way nursing personnel use their time as these ratios vary?

Methodology.—Two units in each hospital containing mixed medical and surgical patients were observed Monday through Friday during the 7 a.m. to 3:30 p.m. shift. Bed capacities of the nursing units ranged from 21 to 30 patients. Questionnaires were given to 881 patients.

Two experimental variables were related: nursing care hours per patient and the percent of graduate nurses assigned to the nursing unit staff. Three different sets of hours of care per patient were introduced and combined with three combinations of nursing personnel as experimental variables producing nine experimental situations.

Tools.—Three types of tools were used to obtain data for analysis: • observer's records of the time nursing personnel spent on various nursing activities, • questionnaires of a checklist type that were answered by both nursing personnel and patients, and • personal interviews with nursing personnel and patients. The observer's records yielded information on the amount of time that various nursing personnel spent in different categories of work during each of the nine experimental situations on the four hospital units. Analysis of variance was used to analyze these data. Data from questionnaires were also analyzed using chi square to note significant differences among patients' attitudes on different situations. The data from the personnel interviews were obtained in unstructured interviews so the information presented is not directly quantifiable.

Findings.—There were no statistical differences on the different types of functions performed, other than the fact that the auxiliary personnel spent more time, on the whole, with the patients (or direct care) than the staff or head nurses.

The tasks that were currently assigned to nursing personnel indicated that graduate nurses were more concerned with indirect care, the auxiliary personnel with direct care. The data indicated that the amount of time auxiliary personnel spent on direct care or indirect care was not influenced as much by the ratio of staff nurses as by the total number of personnel on the units. From an analysis of time spent on personal and unoccupied time, much of the auxiliaries' time spent in this area was explained by the independent variables.

Implications from the study questionnaire were three: there is an ideal number and composition of nursing personnel, there is much confusion as to the components of nursing care, and the nurse has a difficult time dealing with patients on a purely social level.

There was a significant difference ($P > .01$) between the number of patients who stated that there were not enough nursing personnel on the units during the weeks when there was an extremely low number of personnel and the number of patients holding the same opinion in high-personnel weeks. However, 64 percent of patients still said there was not sufficient staff during the weeks when the units had a large number of nurses.

When the floors were staffed with a large number of persons, three quarters of whom were staff nurses, the "aide type" of work still remained with the aides. When more staff nurses were introduced most nurses chose to do other things than spend more time with the patient. In high staffing situations, the staff reported the extra time increased boredom and restlessness and much more fatigue. With fewer personnel, both staff and auxiliary personnel expressed satisfaction with the amount of work they were able to accomplish.

Conclusions.—

- The effect of overstaffing on the morale and the work of the nursing personnel is of main interest.
- When tasks are performed in relation to the patients, nursing functions may need to be reexamined.
- Overemphasis of nursing functions may be the reason behind the reluctance of some graduate nurses to spend more time with the patients.
- If a large segment of young graduates do not adhere to the philosophy as taught in nursing programs, it may be necessary to reexamine certain educational programs.
- If continued effort is made to acquaint patients with the reasons behind the administration of nursing-care procedures, they might feel more secure.

Critique

The problem, that of the effect of staffing mix upon such variables as patient response (opinion), staff morale, and allocation of time, is most significant. Few tightly controlled studies have been done.

The study uses an experimental design, utilizing two independent variables (amount of nursing hours per patient and amount of graduate nurse hours) and as dependent variables, patient and staff attitudes, and allocation of nursing time. Combinations of the two independent variables were constructed so that nine sets were derived, ranging from sets of low-low on both variables to high-high. The dependent variables were collected by observation, questionnaires, and personal interviews.

The patient and nurse populations were derived from "working" and "natural" populations on four nursing units.

Standard procedure and protocol were used. The research design is weak in that questions can be raised whether or not 1 week is sufficient length of time for the introduction of the independent variable and its test. No rationale was given for the selection of the length of the test.

The analysis of the data was made by standard and appropriate techniques. The interpretation of the data fell logically from the findings. The authors were cautious, presenting some observations rather than findings. Much of their interpretation was given as a set of questions for further consideration.

The authors drew upon no knowledge framework. The study itself is directed at describing and explaining phenomena more than testing existing theory. There is no use made of knowledge from organizational theory or from psychology or from sociology as the framework for the study.

The value of the study, recognizing the one serious limitation, that of the length of the introduction of the independent variable, resides in the identification of two characteristics of nurse behavior: her task-orientation and her time-relatedness. It raises serious questions about the role differentiation and task performance, the inability of patients to express their perception of care (perhaps because of their preoccupation with actual recovery), and to identify elements imposing restraints or facilitating recovery. Also, it identifies many variables to be considered in staffing. In reality, the study contributes more to the knowledge base of nurse behavior and its orientation than it does to the knowledge base of staffing for patient care.

A52. Newstrom, Phyllis Shank. "An Examination of Some of the Factors Which Lead to Job Satisfaction Among Hospital Supervisory Personnel." Unpublished Master's Thesis, Montana State University, Bozeman, Montana, December 1968.

Review

Purpose.—To discover how supervisory personnel view some of the factors of supervisory nursing and to demonstrate to administrative personnel factors of supervisory nursing leading to greater job satisfaction.

Sample.—Supervisory personnel were employed in three medium sized hospitals in Montana in March 1968. A total of 59 names and addresses of supervisory personnel were obtained from the directors. The job titles of supervisory personnel included assistant directors of nursing service, assistant director of supervisors, floor supervisors, head nurses, and assistant head nurses.

Definition.—Expressionnaire: "A series of questions which are answered by the assessment of feelings and which stem from value judgments."

Rationale.—Job satisfaction is reflected in areas of physiological and safety needs, social needs, role definition, ego needs, and self-fulfillment needs. Douglas M. McGregor, "The Human Side of Enterprise," *Readings in Human Relations* (second edition, New York: McGraw-Hill Book Company, 1964), pp. 41–43.

Instrument.—The expressionnaire consisted of 38 questions concerning security and safety-needs, social needs, role definition, ego needs, and self-fulfillment needs. Each of these questions could be answered by checking one of four categories: very satisfied, satisfied, dissatisfied, and very dissatisfied. Three introductory questions were related to type of nursing education, length of present employment and length of time respondent had worked in a supervisory capacity. One open-end question allowed the respondent to elaborate on one particular area of the job she would wish to change.

The expressionnaire was presented to six graduate nursing students who had worked in the nurse-supervisor role. Several areas were reworded. The revised tool was sent to three registered nurses working in supervision in Montana hospitals. No suggestions were given by this group who completed and returned the expressionnaire.

Procedure.—Forty-six of 59 expressionnaires were returned.

The sample was defined in terms of preparation. Three nurses held an associate degree, 32 had diplomas, 10 had baccalaureate degrees, and one a master's degree. The length of employment in the hospital, where they were currently holding supervisory positions, ranged from a few months to 21 years. The responses to the 38 questions were totaled to determine the responses that reflected pertinent findings, to determine the totals from each of the five sections of need, and to compare the total years of employment.

A total of 2.7 percent of the items requesting responses were left unanswered.

Findings.—Nurses included in this study express more satisfaction regarding all factors of supervision than they express dissatisfaction. The social needs seem to have been well met by the employer. Satisfaction with coworkers, view of rest periods, tours of duty, and method of payment were high. The one dominant area of dissatisfaction was the lack of orientation to the position of the supervisor. All nurses employed in supervisory capacities from 1 through 15 years listed orientation to position in supervision capacity as the greatest factor in dissatisfaction.

The response to the open-end questions revealed a need regarding preparation for their respective positions.

Critique

The assessment of job satisfaction of nursing supervisory personnel is a pertinent area for study. There is a constant need for able supervisory personnel in the field of nursing. To attract and retain nurses in supervisory positions has presented a problem for the nursing profession. If areas of dissatisfaction with supervisory positions can be identified and corrected, it would in part provide an answer to this problem.

Newstrom attempts to assess job satisfaction through the use of a questionnaire designed to study needs defined by Douglas M. McGregor, as they relate to job satisfaction: psychological and safety needs, social needs, role definitions, ego needs, and self-fulfillment needs. Questions for securing personal data are included. The instrument was inadequately tested.

The sample is small, 46. Data were secured from nurses in all levels of supervisory positions with varied educational backgrounds and having varied lengths of employment. It would seem that a study of one level of supervisory personnel with similar backgrounds would have provided more meaningful results.

The value of this study was in the method of assessment and the results. Nursing administrators should find this study informative and interesting. It makes a limited contribution to nurse staffing design.

A53. Price, Elmina M. *Staffing for Patient Care.* New York: Springer Publishing Company, Inc., 1970.

Review

Purpose.—"The first purpose of this project was to improve staffing practices through an intensive study of staffing methods that would culminate in an actual staffing experiment and its evaluation. The second purpose was to increase—through the conduct of this community research effort—the understanding of the methods and value of applied research."

Method.—The requirements for hospital participation were that a research coordinator be named from the staff of the respective hospital and that two comparable units be chosen from which an experimental and control unit would be used in the study. Five of the 24 hospitals in the Minneapolis and St. Paul, Minnesota, area agreed to participate in the study. These five represented the "best possible sample of local hospitals according to control, size of patient population, and accessibility for the research staff."

The central research staff consisted of the principal investigator, two assistant investigators, an assistant responsible for patient classification, and secretarial assistants. A project advisory board composed of key persons from related occupational fields met at the inception of this project and every 6 months throughout the study. Each hospital had its own advisory board consisting of heads of departments within the hospital.

The first 6 months of the project were devoted to inservice education regarding staffing. Literature was reviewed, field trips were made, staffing models were developed, and baseline data from each hospital were collected. During the next 6 months, cyclical staffing was introduced on one unit in each of the five hospitals. During the 6-month period, data were collected on the experimental and control units.

A study was undertaken to develop a method of assessing patients' needs—a method that would identify required extra staff on the experimental and control units on a short-term basis. The study was limited to the care of adult patients in medical and surgical units. The proposed system of patient classification was based on physical needs and the assumption that the present quality of care (as expressed in time) was the desirable standard. A system was developed of assessing patient needs based on the activities of daily living, medically delegated treatments, and special needs. In a period of 2 days, each coordinator rated the patients on the units in her hospital. The coordinators also used the Johns Hopkins system or the Williams system of patient classification on the same patients. Each coordinator and another person in her hospital rated the same patients. (In four hospitals the second person was a nurse, but in a fifth hospital a ward secretary did the rating.) In four hospitals the reliability coefficients between raters in the first trials ranged from .73 to .88. In the fifth hospital, the reliability coefficient was .88 on the third trial. The raters obtained their information from records of physicians' orders and the kardex on one unit in each hospital.

Data were collected for a period of 10 unconsecutive days. The conclusions indicate that the classification of patients according to three categories of personnel required to care for them had the highest correlation with the Activities of Daily Living form. There seems to be sufficient relationship between physical needs and nursing needs to warrant classification by selected physical needs alone. The techniques of Williams and Johns Hopkins take less time and do correlate fairly well with the more comprehensive system. The 1–3–5 rating was not feasible because of the time involved. If the exact number of personnel needed were always available, there would be few staffing problems.

Prior to the development of cyclical staffing models, an opinionnaire was administered to all nursing personnel on each study unit. One hundred seventy-eight persons answered the opinionnaire. Eighty-seven percent knew their hours less than 3 weeks in advance; however, all respondents would have preferred more notice. Although 59 percent said they worked seven or more consecutive days, only 24 percent said they preferred 7 or more days. The preference for rotation and nonrotation was about the same. Forty-four percent of the respondents stated that their hours were never changed once they had been posted. Ninety-six percent of the respondents felt that their hours were assigned fairly. Seventy-three percent did not prefer split days off and 90 percent preferred 2 consecutive days off. Most personnel preferred to work the day shift before having a day off and preferred to come back on duty during the day shift.

The research staff analyzed 4 weeks of actual nursing service hours scheduled for each unit in the study. The actual hours reflect an effort to provide for consecutive days off and cyclical patterns would continue this and, in addition, would provide equally for all levels of personnel. The cyclical patterns could also decrease the number of personnel scheduled to work two shifts and arrange that personnel work a day prior to days off and come back on day duty.

From the list of existing work schedules only on 17 to 38 percent of the consecutive days that a patient was hospitalized did the same nurse give care for 2 consecutive days. The preliminary survey also showed wide variation in numbers of persons on duty for each of the three shifts and for different days of the week.

Specific employment agreements were kept in mind as cyclical patterns were developed.

A questionnaire was sent to 29 hospitals in the area to survey local staffing practices. Eighty-six percent responded. Some of these utilized cyclical staffing and patient classification systems. None of the scheduling patterns incorporated the range of factors deemed necessary to the investigators.

Guidelines were developed for cyclical staffing and these concepts were incorporated into models for such staffing. At the end of 6 months, each member of the group had developed at least one workable model for rotating and nonrotating staff. Each model included the shift worked, number of times the model called for consecutive days off, return shift working nights, and number of single days off. The questions to these data helped make comparative evaluations of the various models. Total staffing was calculated for each staff for each day of the week.

Instruments.—Each instrument was reviewed by the research staff prior to data collection. Suggestions from the participants were considered in revising the nine forms used to obtain objective evidence demonstrating the relationship between staffing practice and dependent variables. The forms include: personnel hours, hours of personnel absences, salaries, time spent on staffing, continuity of patient care, personnel changes, staff questionnaire, physician interview guide, and the patient questionnaire. Personnel hours were related to patient census. The frequency and reasons for personnel absences were recorded. The gross wage paid to nursing service employees was documented for various calendar pay periods. The amount of time spent in advance planning and daily adjustment of personnel hours was determined. The form for continuity of patient care required information regarding the number of consecutive days in which an employee is assigned responsibility for a given patient. Arbitrary decisions were made concerning continuity on weekends. A 33⅓ percent sample (based on hospital numbers) of the population was studied for continuity. Personnel changes in terms of additions, transfers, and separations were documented. A staff questionnaire was developed to determine satisfaction of personnel in relation to staffing. The questionnaire did not discriminate regarding the factors involved in this study as acutely as the research staff anticipated. A physicians' interview guide was developed to involve the physician and determine his evaluation of change in staffing. A patient questionnaire was developed to determine the satisfaction of patients and the demography of the patients. Questionnaires sent to patients after their discharge resulted in 50 returned questionnaires.

Sample.—Pretest information was the basis for deciding that a 33⅓ percent sample would yield a minimal usable sample of 5 percent for continuity of care. Questionnaires were mailed to all patients on the experimental or control units who remained in the hospital more than 4 days. All nursing staff members from the experimental and control units who had worked on the unit 20 days were included. The physicians included in this study were physicians who had 20 or more patients on the unit on a randomly chosen day each week for 4 weeks. Medical residents who had been assigned to the unit for at least 30 days were included.

Findings.—The data on census and nursing care hours from the five hospitals show that there was similarity in experimental and control units. The cyclically planned hours of care per patient were varied in five hospitals from 2.6 to 4.27 hours, but, in each hospital, the hours actually provided for the 24-hour period exceeded the basic plan. The average hours of care between the experimental and control units varied from 2.32 to four times that amount. There was an inconsistent direct relationship between low occupancy and high average hours of care per patient. The analysis of hours of nursing care by days of week showed marked differences among hospitals. There seemed to be no relationship between classification of patients and/or census with nursing hours. Correlation varied from −.33 to +.98. "In all the hospitals included in this study, classification of patients for the purpose of adjusting nursing hours to patient needs proved to be a waste of time."

The ratio of various types of personnel was calculated and indicated markedly different practices employed in the five hospitals. None of the hospitals followed the Surgeon General's Consultant Group recommendations of 38 percent professional nurses, 38 percent licensed practical nurses, and 30 percent auxiliary workers. Two hospitals maintained a 38.62 percent professional to nonprofessional nurses but these hospitals were low in practical nurses and high in nurse aides.

The percentage of absence ranged from 6.2 to 7.5 percent on Saturday and Sunday to 10.6 to 10.5 percent on Monday and Tuesday. Absence rate for personnel level varied from 9.9 percent for nurse aides to 7.3 percent for clerical personnel. Variations among hospitals were from 8.0 percent to 11.0 percent. "The evidence from the data regarding personnel absences indicated that absence was directly related to total hours worked."

The total cost of staffing, excluding fringe benefits, was calculated by category of personnel for each of the units. The relationship between average cost per patient day and average census was consistent but the lowest cost was reported for the largest unit and the highest cost for the smallest unit. The cost data collected seemed to favor the experimental staffing but the cost data for the experimental and control groups were not comparable.

Pilot testing had proved that reliable data could be obtained regarding the time spent on staffing. However, data obtained in the study proved to be unreliable because forms were not completed or information given was questionable. Average amount of time spent on staffing ranged from 2.50 minutes per day in one experimental unit to 37.7 minutes per day in one control unit. "From the reliable data that we collected on time spent on staffing, we concluded that cyclical staffing resulted in an appreciable reduction in time spent on the original hour planning and on the day-to-day maintenance of schedules."

Continuity of care—care given to a patient by the same nurse for two or more days—was recorded on a 30 percent sample of patients on the control and experimental units. "Similarities between the data from the control and experimental units indicated that the experimental staffing pattern had no influence on continuity of care as defined on this project."

Summary of personnel turnover on both units was prepared over a 6-month period of each hospital. "The addition rate indicates need for orientation during all months except May, while the separation rate suggests that few vacancies should be scheduled during August."

Questionnaires were administered before and after the experiment to elicit reactions to staffing. Those on the experimental units completed one additional section related to cyclical staffing. For each of the 15 factors listed, the respondent indicated whether the change over the 6-month period was much better, better, no change, worse, or much worse. Three open-end questions were asked. "The results show that there was about as much change in reaction on the control unit as there was on the experimental unit." However, the staff members indicated that the most favorable aspects of cyclical staffing were the ability to plan ahead, fewer long work stretches, and fewer evenings worked followed by a day shift worked. The only dissatisfaction with cyclical staffing was the rotation of shifts, which in actuality was separate hospital policy.

"The physicians noted no difference between the experimental and control units that could be attributed to cyclical staffing."

A questionnaire asked patients, after their hospitalization, to state their reactions to various elements of staffing. The difference in the number of patients who did and did not return the questionnaire relates to the type of accommodation the patient had in the hospital. Those answering the questionnaire were more apt to have private rooms and been seen by private physicians. The census and demographic information describing patients was similar for patients from the control and experimental units.

A goal of this project was to involve and inform persons from the community about the education-research effort in staffing. Research staff, hospital personnel responsible for staffing, project advisory board, hospital advisory board, patients, and nursing and medical staff members were involved in this project. "There is no doubt that considerable community education was provided through this effort in applied research."

Another goal at the beginning of the project had been to assign personnel to work groups. Because of undesirable fluctuations in total staff units, the work group of two or three people was modified so that the work group became the entire staff on a unit. Computerization was thought to be an outcome of this project, but the data collected on categories of personnel and patient needs did not have sufficient reliability and validity to recommend computerization.

"The cyclical staffing developed in this study resulted in improvement with regard to five of the dependent variables—personnel, hours, cost of staffing, time spent on staffing, and staff reaction. No difference between the experimental and conventional staffing was found in regard to five variables—absences, continuity of patient care, turnover of personnel, patient reaction, and medical staff reaction."

The greatest improvement resulting from cyclical staffing had to do with planning and maintaining schedules.

The education regarding staffing was most valuable to the research staff and hospital personnel directly responsible for staffing.

Critique

Cyclical staffing methods are frequently employed in hospitals today with generally satisfying results. These methods were developed in an effort to better the utilization of the nursing service staff and arose from the pressures exerted by rising hospital costs and deficient numbers of available nursing personnel.

Price proposes this project to improve staffing practices through an intensive study of staffing methods, cyclical staffing versus conventional staffing, that would culminate in an actual staffing experiment and its evaluation. She proposes to increase through the conduct of this research effort the understanding of the methods and values of applied research.

The framework of the study is developed. Rationale for the study is sound. Related literature is reported to have been reviewed but is not included because the author found it to be of little value.

However, a digest of literature on staffing is included that is appropriate for the basis of this study.

The samples are adequate. Two similar medical or surgical units in each of five short-term hospitals were studied. Each hospital is markedly different. Differences in physical design of the units could in some degree alter the findings.

Independent variables studied are the hospital units with conventional staffing and the hospital units with newly designed (cyclical) staffing. Intervening variables studied are patient population, unit size, physical design, logistic support, mix of personnel, medical staff, and practices and policies. Dependent variables studied are personnel hours, personnel absences, cost, time spent on staffing personnel changes, continuity of patient care, patient satisfaction, and physician satisfaction.

The survey method is employed. Variables studied on the experimental and conventional wards in each hospital are compared. The innovative feature of design lies in the identification of the constant and variable factors that influence staffing in a broad spectrum of general short-term hospitals that were selected by type of control and services provided.

The instruments employed in the collections of data are described; rationale for their development is included. The instruments are adequately tested; samples are included in the appendixes. Assessment of quality of care is lacking.

Personnel involved in the study are well oriented. The orientation programs are described. Well qualified persons are used in consultation for the study.

This study should prove valuable to hospital administrators, nursing service administrators, and research persons who are interested in assessing staffing methods in their hospitals or considering the employment of cyclical staffing methods. Findings reported for the various levels of hospital enhances its applicability to specific hospital situations. Identification of the constant and variable factors influencing staffing in a broad spectrum of short-term general hospitals is the major contribution to nurse staffing research design.

The findings of this study indicate that cyclical staffing methods were most beneficial to hospital personnel. The investigator has admittedly made little attempt to assess quality of care but has hoped to improve it in some degree through continuity of nursing personnel assignments.

A54. Reiter, Frances, and Kakosh, Marguerite E. *Quality of Nursing Care.* (RG 2734) Report of a Field Study to Establish Criteria, 1950-54. Graduate School of Nursing, New York Medical College, New York, March 1963.

Review

Purpose.—The purpose of the study is defined as an attempt to establish valid, reliable, and usable criteria for the appraisal of the quality of nursing care that selected patients receive in hospitals.

The study evolved through a period of 4 years. Hundreds of cooperating nurse practitioners contributed to the study at one period or another.

Hospital nursing and nursing situations were described and explained. Literature describing nursing care was analyzed.

Objectives.—

- What constitutes quality care?
- What are the differences in the quality of nursing approaches, activities, understandings, and skills in relation to the effectiveness of nursing care that patients receive?
- Can the components of nursing care be identified and how can they be described in an instrument or guide for purposes of qualitative appraisal?

Method.—The method of procedure varied from phase to phase though the original draft was followed for the most part.

As a basis for the study, the functions of nursing were defined. The definition, accepted by the investigators, is broad, encompassing physical, emotional, and social aspects of nursing and defining the nurse's active participation in the health team. The study is an exploration of scientific applications in nursing care of some selected hospital patients to identify valid factors related to quality of care. Patient nursing care situations were selected on the basis of • social significance, • frequent occurrence, and • importance of nursing in the therapeutic regimen and management. After giving consideration to the components of patient care, the authors concluded that in nursing care of patients in any one specific clinical condition there was much that was general to all nursing. If the full content of the problem of quality was to be studied, the patient as a whole would have to be studied.

The study of the specific care of selected patients was moved to a closer examination of general components of nursing care. Nursing care with patients having heart disease proved to be pertinent to care of all patients.

To define nursing care, the critical incidence technique was employed. One hundred incidents, 56 incidents of effective and ineffective nursing care and 34 nursing incidents of sensed differences in quality describing the nursing care seen or given, were analyzed. These incidents fall into three groups: • emergency situation, • marked improvement of poor nursing care, and • directive patient teaching. An analysis of these proved to be unsuccessful. The decision was based on the premise that the nurses may have been functioning on an intuitive level rather than on a scientific one.

Appraisal of incidents by group judgment was based on Hunt's three findings from the field of social work:

- high reliability in judgment of workers on the same cases,
- reliability increased with the amount of professional training and experience of case worker judges, and
- case workers possessed a core of criteria for improvement in clients.

In an attempt to approve quality of care, it was assumed that nurse-practitioners would function in a similar fashion. Twelve components of nursing care were accepted as guides for observation of nursing care received by any patients. The description of these components was contributed by Mary Houston, Boston University.

Development of scale.—Initial attempts to appraise quality of nursing care, defined in the appendix of the report and using the 12 components, were made by a group of medical and surgical nursing students. Forty nurse practitioners attempted to define qualitative differences from descriptions of nursing practices in six defined categories: dangerous, safe, adequate, optimum, maximum, and ideal. Over a period of a week's observation, examples increasingly fell into the first three categories only. It was concluded that this was either due to limitations of ability to observe and record incidents or inability to preceive concepts of standards of nursing beyond those found in practice. When patient care involved persons other than nursing, it was impossible to categorize.

Nurse practitioners then sought either to find or to provide themselves nursing care incidents that in their collective judgment would give descriptions of practice that would fall into the higher categories. This decision led to a review of components of nursing, a study of qualitative categories, requirements of categories, and their descriptions. The category "dangerous" was eliminated. The scale began with safe and moved along a positive continuum. The scale was recognized as being cumulative. The category "maximum" included all of the items listed under "optimum," "adequate," and "safe" plus those items peculiar to the maximum category.

It was increasingly difficult to identify examples of practice that could be placed in the categories of higher values. Certain factors affecting quality of nursing care were identified within the nursing practice. Other factors lay within the hospital setting and outside the realm of nursing service. Components overlapping the hospital setting and nursing setting were difficult to apply to qualitative standards. In the use of the scale, it was believed that the nurse practitioners were identifying with the patient receiving the care, rather than giving attention to the nurses giving the care. A need for study, testing, and revision of the scale was necessary.

The qualitative scale of components of nursing care and a method of using the scale gradually evolved. Quality was studied through the examination of elements in nursing care received by the medical-surgical patients. Concepts of nursing practice were broadened, defined, and clarified, and the components that could be qualitatively appraised were identified.

Some external factors involved in total patient care, not dependent on quality of nursing care alone, were identified:

- Administration of the nursing service department.
  - utilization of professional and nonprofessional nursing personnel,
  - amount and quality of supervision,
  - continuing professional education of the nursing staff,
  - development of professional nurse leadership for auxiliary nursing personnel.

- Effectiveness of hospital administration.
    - extent to which hospital services provide supplies, services at time and place as needed by patient,
    - extent of inservice training programs to prepare auxiliary personnel.
- Medical leadership and expectations of standards of nursing care acceptable to patients.
    - nurse-doctor relationships effect on patient welfare,
    - status of nurses in allied medical professional group relationships.

Second year.—The second year of the study was devoted to a search for a more adequate basis for appraisal of quality of care and to outlining an observational guide to be used as a measuring device for appraisal of patients' overt or covert responses to nursing care.

In developing a basis for standards of nursing care, the authors drew upon a number of sources. Both quantitative and qualitative aspects of nursing care were again considered. The qualitative scale ideal, maximum, optimum, and adequate were eliminated after deficiencies were discovered in each. Herman Finer's report to the Kellogg Foundation on *Nonmeasurability of Quality of Nursing Care* was influential in this change. His rationale presented the facts that there are different types of nursing care and that there are qualitative differences within each type. Nursing care was then classified: Type I, Rehabilitative; Type II, Supportive; and Type III, Custodial.

A diagram of nursing abilities necessary in practice was prepared by 30 graduate student nurse practitioners who were oriented for the second year's work. They also wrote descriptions of "best nursing care" from observations of nursing care given by others. These provided more illustrations of the current concepts of nursing.

Using the method drawn from John C. Flanagan's study *Critical Requirements for Research Personnel,* 56 incidents of effective and ineffective quality of nursing care were submitted to 28 graduate nurses and incidents of critical quality were isolated.

Thirty-four nursing care situations were constructed to illustrate the three types of nursing care. Forty-four graduate nurses attempted to place each situation in one of the three categories. Twenty-two nurses classified them into highest, middle, and lowest quality. The other 22 nurses placed them into rehabilitative, supportive, and custodial categories. This was to serve as a test of validity and reliability. There was greater agreement in the latter categories and more agreement in the two extreme groups.

Two quality factors, "safety" and "effectiveness," were isolated for appraisal. It became evident that *effectiveness* is a purpose common to all types of care and *safety* serves as a basis for appraising the quality of all nursing care.

In the analysis of these factors of quality, the authors decided that both segments and types of care must be used.

The segments of nursing were defined: • patient care, • nursing practice, • dependent nursing practice, • interdependent nursing practice, • hospital nursing care, • direct nursing care, and • indirect nursing care. The segments were examined separately, then reintegrated and studied within the whole context of nursing care. Field observation of nursing practices in hospitals was the approach used for this phase of study. The study director observed nursing care given by all levels of nursing personnel and in team nursing situations. The findings were similar to those found by the nurse practitioners at the end of the first year.

Senior students in several hospitals, the exact number was not included, observed practitioners giving total "patient care." Student nurses and nurse practitioners were asked to give brief descriptions of the persons for whom they cared. Attempts were made to identify results of nursing care in which the patients expressed their reactions to the nursing care. It became apparent that the appraisal would have to be made on an individual basis and that observations during rendering direct care were most helpful.

Findings indicated that • it was at the point of direct application where the nurse exercised her control and determined the manner of her practice, and • a nurse-patient conversation was thought to be the manner in which the nursing care was carried out and accepted by the patient. This is the point where one can observe the immediate response of the patient as to what only the nurse does and how she does it, and arrives at cause-effect relationship between practice and effect.

The director of the research spent 10 days giving direct patient care in the department of psychosomatic medicine at Duke University as a means of reexamining the records of observations of others. The objective of the program at Duke was to help nurse practitioners develop communication skills while giving nursing care. Case conferences and evaluations were part of the learning experience.

Bases for appraisal of quality were reestablished. The eight principles of Isabel Stewart were applied in the appraisal of administration of nursing measures and appraisal of the nurse-patient relationship.

In establishing criteria, the idea of "movement" was adapted to nursing care. A scale drawn from major concepts from Erikson and Towle and Hunt was devised to indicate a possible cause-effect relationship between nurse objectives and patient progress. The patient's progress is shown by developmental tasks and accomplishments through interactions with the nurse.

The observation guide, limited to qualities of safety and effectiveness, was developed for the three types of nursing: • palliative-custodial, • restorative or curative-technical, and • rehabilitative-comprehensive. The guide was based on nurse objectives and on patient progress in a cause-effect relationship, listed under three headings: • providing personal hygiene, • administering treatment measures, and • nurse-patient relationships.

Patient progress was based on social science principles and on interpretation of them from helping professions. Methods of appraisal were based on experiences of an allied profession. The validity of the critical questions on the guide was based on logic of the empirical process by which they were evolved and formulated.

Third year.—The third year was devoted to a search for the differences in nursing operations that were distinctly professional in nature.

The use of the guide was tested by two graduate students with different experiences and interests. Each observed 15 direct nursing care activities. Three observational methods were used as tests of reliability in collecting data: • selections were viewed independently at different times; • in five situations observers worked together, one recording what was heard and the other what was seen; and • in eight situations both recorded what was seen and heard. Observations averaged 15 minutes; data were collected over a 3-week period. Each student categorized the situations.

There was complete agreement in 14 of the 15 situations. Findings suggested that • nurse observers of different backgrounds, preparation, etc., could classify data with considerable consistency and reliability; • distinctions can be made between types of nursing care; and • criteria within types of nursing care are additive or cumulative. Eighty-six percent of nursing care situations were categorized in Type I.

Based on individual use of the guide and on group judgments of nurse practitioners, it was suggested: • items on the guide discriminated differences in the three types of care, • the guide should be applied to written records of nursing care, • it should be more simply introduced for better orientation of the user, • type I might be an appraisal of professional nursing care, and • rank order of placement of types from left to right on the guide should be reversed from low III to high I.

Eight nursing care studies of senior nursing students were examined to test the guide. Critical items on the guide were used to identify nursing activities and patient responses. The results of this analysis were:

- types of individual activities could be categorized, but insufficient numbers of nurse-operations and patient responses in the descriptions made it impossible to appraise quality of total patient care, and
- usefulness of the guide in appraising nursing care through written records would have to include what the nurse did, how she acted, and how the patient responded.

A chart showing nursing operations of increasing complexity for the three types of nursing care was used for orientation and discussion of the guide.

An attempt was made to identify those differences in nursing operations that were distinctly professional in nature. Definitions of professional nursing were examined for statements related to practice or the practitioner that might be translated into nurse-operations observable in direct nursing care.

Criteria applicable to any profession were selected. Definitions of Abraham Flexner, Ralph Tyler, and Dr. Byrne Horton were reviewed. The guide and its specific criteria were examined in light of these. It was concluded that direct care listed in Type III is of an elementary nature; Type II, of a technical nature; and Type I, of a professional nature.

In the study of communications as a nursing skill, a group of previously oriented graduate nurses wrote descriptions of "best" nursing care and kept daily diaries including patients' conversations with the nurse. This experience sensitized the student to the social setting and climate in which the patient receives nursing care. As one result, listening seminars, 1 hour weekly for a period of 6 weeks, were held. The concepts (a) to permit the patient to express his feelings and (b) to encourage him to do so were established and some specific relevant nurse operations were outlined.

A study of communication skills was conducted. In an attempt to create a procedure for listening, speaking, and observing, 40 verbatim nurse-patient conversations were collected and analyzed by students. Two nursing experts and one English communications skill expert served as jury on a test for reliability. There was unanimous agreement on 29 conversations and some disagreement on classification of 11.

A nursing procedure based on communications skills was created. Steps for the procedure were formulated.

To simplify the guide, the design was based on three types of nursing care and two areas of nurse operations: • promoting personal and mental hygiene, and • administering treatment measures.

At the completion of the third year the guide had been refined and pretested. It incorporated a sufficient number of items of discriminative value to be useful in appraising nursing care. More discerning testing was necessary before criteria could be established.

As the criteria for appraising quality of nursing care were being evolved, the four major concerns throughout the study were centered around validity, objectivity, reliability, and usability.

Based on the findings of Hunt in regard to reliability, 45 experts in nursing, meeting established qualifications, and 12 experts from other fields were selected to review and judge the overall value, clarity, and discrimination between types of nursing in the guide and to make suggestions for its enforcement and use. Visual and auditory presentations were recommended to present the complete picture in Type I care.

Description of the guide.—Specific criteria of quality are expressed in terms of: operations, objectively observed in direct nursing care and applied only within the limitations of the patients' conditions; medical diagnosis; plan of treatment; and hospital policies and practices.

Criteria that indicate the nature of the nursing care provided are designed for elementary, technical, and professional. Specific nurse operations or criteria are grouped as administration, observation, teaching, and communication.

Nurse management consists of (a) selecting the approach appropriate to the individual patient and the situation, and (b) the timing and performance of the nurse operation.

The three levels of care: elementary, technical, and professional, are described in light of patient needs and the nurse's role.

As a result of the extensive use of the guides, criteria for appraising quality of direct nursing care were developed and established.

Defense of criteria.—The criteria were considered valid because they were evolved from actual nursing care situations that were observed and described by nurse practitioners and further established through recognition and acceptance by nurse practitioners and experts.

Objectivity was felt to be accomplished by limiting the criteria to only observable nurse-operations in the direct nurse-patient setting.

Reliability of criteria was obtained through securing judgment of many individual nurse practitioners and critical judgments of nurse-experts.

Usability of criteria was established by field testing while nurse practitioners were attempting to define standards of nursing care and to appraise the quality of nursing care being rendered.

Critique

The problem of predicting the number and kind of staff is real. Equally real is the appraisal of the impact of that staff upon patients. The problem of quality control, so that cost-effectiveness can be realistically considered, is no small problem. The question of quality of care and its relationship to staff performance is highly relevant in any consideration of staffing.

The study reported by Reiter and Kakosh is one of the pioneering attempts to define quality and to measure it. The report is a description of the authors' 4-year wrestle with the problem. Data represent nurse-patient interactions obtained through use of the critical incident techniques, case writing, observation, and literature review. Much of the material evolved from courses in which the two were engaged as faculty members and from seminars taught by colleagues.

The report is difficult to read. Although it is organized longitudinally, moving from one phase to another, and by year, the interweaving of rationale, philosophy, and method is confusing to the reader. The writing also reflects the change that occurred in the thinking of the authors. The beginning represents a global approach, but as data began to feed in, as more questions were posed, questions became more specific and the approach narrowed.

Materials for the guide were submitted to field testing, expert jury, and analysis by practitioners. Defense is proposed for validity, reliability, feasibility, and objectivity. The defense rests primarily upon face validity and percent of agreement among "experts." The research is not a tightly conceived design. It was not intended to be that kind.

This study is well known in the nursing literature. Frances Reiter is highly respected as a practitioner. Several articles on the concepts developed in the field study have appeared in the literature. The concept of different levels of nursing practice are derived, in part, from this work. However, the criteria established for observing quality in this work have not been widely promoted and used. It is timely that the study be used as a basis for defining quality control statements. Some of the ideas lend themselves to sharper definition and to reduction in scope. The study has much to commend it. It is unfortunate that it is so poorly written.

A55. Repp, Eleanor Carlotta. "A Study of Selected Head Nurse Positions to Compare the Findings of Two Methods of Studying Them." Unpublished Master's Thesis, University of Texas, Austin, Texas, May 1961.

Review

Location.—The University of Texas Medical Branch Hospitals.

Purpose.—To show that analysis of the individual tasks performed by several head nurses reveals facts that are not revealed by the standard function study.

Methodology.—This is a study of four selected head nurse positions undertaken to compare the findings of two methods of studying them. The first method is that of the task study in which individual tasks are analyzed. The second method is that of the established function study in which activities are grouped and studied by areas.

The head nurse positions selected for this study were in four nursing units: two surgical, the emergency room, and the recovery room. The first two units were equipped to care for white, adult, resident patients on a 24-hour basis. The census consisted of general surgery patients who were cared for through the preoperative and postoperative basis. General medical patients were admitted to these units as a temporary measure. The average patient census on unit one was 36 patients a day while that on unit two was 38 patients a day. Unit two was assigned 24 more hours of vocational nurse time and 40 more hours of nurse aide time than unit one. Unit one was assigned 16 more hours of ward clerk time. Medications were prepared in the nurses' station on unit two but in a medication room removed from the nurses' station on unit one.

The emergency room and the recovery room were similar in that they were • examples of specialization of patient care; • the age, sex, or color of patients cared for on these units were not limited; and • the care of patients on these units was aimed at short-term care, usually a matter of hours, not days. The emergency room and the recovery room were dissimilar both to each other and to unit one and unit two in size, location, physical plant, patient census, number and level of personnel, and clinical division.

The data were collected by direct observation with timing and recording of the individual tasks as they were performed by each head nurse. The observations were planned to be as similar as possible on all four units. Observations were made for the entire time that each head nurse was scheduled on duty for a period of 5 days.

The following criteria were used to identify the beginning of a new task: • responding to a different person, • changing physical activity, and • changing the purpose of physical activity.

The data were first categorized according to activity areas. Individual tasks were classified according to: direct care, indirect care, personnel, unit management, institutional objectives, and personal.

The time spent performing each individual task was computed to the highest minute. Tasks requiring less than 1 minute to perform were recorded as consuming 1 minute of time. Tasks requiring more than 1 but less than 2 minutes were recorded as consuming 2 minutes.

For the *task study,* the classification of individual tasks according to activity areas was used only to organize the gross amount of material into orderly form. An analytical table was prepared categorizing the individual tasks for each head nurse as the tasks common to all positions, the tasks common to two or three positions, tasks peculiar to one position, and those that demonstrated some degree of commonality.

For the *function study,* the classification of individual tasks according to activity areas was used to group the activities of the head nurses studied. An analytical table was prepared summarizing the data about the six areas of function as follows: (a) the number of activities in each area of function, (b) the percent of the total number of activities in each area of function, (c) the minutes of time spent in each area of function, and (d) the percent of total time spent in each area of function.

The findings of each method were summarized and variations in the results of the two methods were identified.

Findings.—The following points summarize the major findings of the two methods of study:

- In the function study, all four head nurse positions showed a high degree of commonality; in the task study, the same four positions showed a high degree of variation among positions.
- The function study indicated that the time spent by each head nurse in activity areas not common to all of the positions was not significant. The task study indicated that the time spent by each nurse performing tasks not common to all positions was significant in terms of the percent of time.
- In the function study, summarization of the findings according to the number of activities performed by each head nurse in each activity area revealed variations among positions in the number of activities in each area but did not reveal variations in the activities themselves.

Conclusions.—The findings of this study support the thesis that the function study alone disguises certain variations among head nurse positions. The fact that variations in the individual tasks, as revealed by the task study, consume a significant amount of each head nurse's time indicates that they may be important to a clear understanding and interpretation of the head nurse position in terms of policies and procedures for selection, orientation, education, and evaluation of personnel.

Critique

Inherent variation in nursing work is fairly well accepted as a fact, but the identification of the variables contributing to the variation, although some have been suggested, are elusive. There are variations in the makeup of tasks which, when grouped, make up functions and are thought to be significant in the explanation of changes that occur as the result of workload. This master's thesis is an attempt to examine variation in the work of head nurses. The study is relevant to nurse staffing in that it describes a methodology and demonstrates its application. Since it proposes criteria for determining the beginning of new tasks, a problem existing in a study of tasks, the methodology is useful.

The sample in the study is too small to draw generalizations from. However, the thesis serves as a small pilot study and suggests premises upon which a larger study could be based.

A56. Robinson, Gary John. "Nursing Unit Activities: A Computerized Work Sampling Methodology." Unpublished Master's Thesis, Yale University, New Haven, Connecticut, 1966.

Review

Purpose.—The purpose of this study is twofold: • to determine how nursing service personnel divide their time between patient care and unit activities, and • to develop a generalized computer program capable of accepting data in the simplest format (prepared for IBM 1401).

Method.—Work sampling methodology, standard in character, was used. Four nursing units, two medical and two surgical, at Montefiore Hospital and Medical Center generated the data. Nurses were trained to serve as observers. Data were collected at 15-minute intervals, over a 24-hour period for 7 days. Standard observation sheets and activity coding were established. The data were categorized into nine classifications: • direct care, • indirect care, • clerical, • administrative, • dietary, • building service, • personal, • other, and • supplies and equipment. These were then regrouped into four: • patient care, • clerical and administrative, • personal and standby, and • other. The computer program was designed in such a format that data could be analyzed in many ways. Activity categories were examined by a variety of cross references such as: time of day of occurrence, personnel category performing activity, by units, and time of day by personnel category. The Johns Hopkins Patient Classification System was used to examine degree of patient illness and its relationship to other factors, such as activity category and category of worker. Statistical treatment of data was by the chi square, which had limited application, and by the comparison of percentages.

Results.—A number of findings resulted from the study. The major ones were:

- Between 51.9 percent of unit personnel time was spent in patient care.
- Personal and standby time accounted for about 18 percent of the time, whereas the "normal" allowance for meals and coffee breaks allows less.
- Clerical and administrative activities are very high in amount of time consumed.
- Differences of activity between personnel of differing categories on the same clinical services and between clinical services were found not to have occurred by chance, with seven exceptions. These exceptions occurred in the head nurse, registered nurse, and ward secretary.
- The main sources of disagreement among head nurses and assistant head nurses are in the activity categories of direct and indirect nursing care and personal time, and the variation is due to other than patient classification.
- Wide variations exist in work patterns of the nursing unit personnel.

Conclusion.—The computer program made speed and comparability of data possible but the greatest concern in its use is the time required for coding (the author suggests use of a document reader to speed up the process). He concludes that up to 40 percent of the working day of nursing personnel is spent away from nursing care. Nursing personnel have highly independent work patterns, but "little or no relationship between medical and surgical units."

Critique

The problem of nurse usage of time is an appropriate one, but the question of whether analysis of present day practice alone is valid can be raised. If the intent is to provide baseline for introduction of change, then the provision of a method for obtaining data of time spent is appropriate. The author states that this is his interest.

The methodology is a standard one already well tested. His application to a computer program appears standard also.

His interpretation of some findings are not congruent with the statements that he gave as findings. He stated that attention should be directed toward delegating clerical and administrative tasks to other personnel. Yet, very few of the duties falling in this category and accounting for 32 percent of the time are strictly clerical. He also commented that lack of standardization of work patterns reflects lack of job descriptions and failure to utilize methods courses; he did not examine factors that may be contributing to this variation. There is a reference to other studies and the inability to make comparisons, but he failed to recognize that variability itself is one aspect of the studies that can be explored.

There is little question but that the author describes a respectable methodology and computer program for studying nursing activity. The study does not draw upon the rich literature dealing with approaches to describing nursing activity (acts), nor does it do more than refer to the fact that work sampling is an approved approach. The theory behind work sampling techniques is not summarized.

The study provides a sound methodology for work sampling and framework of a computer program. Since the study was limited to nursing units of a particular setting, generalizations cannot be made of the findings. However, the findings do substantiate what has been reported in other studies about the amount of time spent in various categories.

A57. Salmon, Brian. *Report of the Committee on Senior Nursing Staff Structure.* Ministry of Health Scottish Home and Health Department, London: Her Majesty's Stationery Office, 1966.

Review

Purpose.—This committee was appointed by the Secretary of State for Scotland and the Ministry of Health, "to advise on the senior nursing staff structure in the hospital service (ward sister and above), the administrative functions of the respective grades, and the methods of preparing staff to occupy them."

There existed no definition of the administrative and managerial responsibilities of the various grades of senior nurse from ward sister up to matron and no generally recognized system of selection and training. The principal purpose of the committee is to consider whether the present structure of senior nursing staff and the scope of their administrative and managerial work need modification in light of modern hospital methods. Therefore, the hospital services at present and those likely to develop under the Hospital Plans of 1962 are considered. The conclusions extend to the organization of nursing services in hospital management groups as well as to the senior nurse staffing structure.

Method.—The Bradbear Committee's list of the administrative duties of the senior nursing staff provided a description of the field to be surveyed. Administrative functions are the work of ordering and coordinating jobs and the people who do them. The term "nursing" refers to midwifery and the training of nurses and midwives for their work. A glossary is included in the appendix for the purpose of clarifying ambiguity of some terms.

The results of the first meeting of this committee were a press notice inviting submission of memoranda of evidence. Three months later a number of organizations were invited to give written evidence within the framework of questions given in appendix 2. Comment on appropriate subject not dealt with in the questionnaire was invited. Thirteen major questions were listed under five broad areas: content of nursing administration, the head of the nursing and education services, senior supporting staff, other senior nursing staff, and preparation of nursing staff for administrative posts. To illustrate the working of the questionnaire, the following questions concerned with content of nursing administration are included: "• What are the principle administrative nursing functions to be discharged in hospitals? It would be helpful to have included (1) those relating essentially to nursing and nursing education, (2) those relating to other matters in which nursing administration has an interest. • Is the function of administering the nursing service compatible with that of responsibility for training students and pupils?"

Later, 27 organization and hospital authorities gave written and oral evidence as listed in appendix 3. With the sample are included: Association of Hospital Management Committees, Miss A. I. C. Bone, General Nursing Council for Scotland, Regional Hospital Board Nursing Officers (England and Wales). The number of written respondents totaled 71. Samples of these are: Association of British Pediatric Nurses, Hammersmith and St. Mark's Hospital, J. R. Robinson, Esq., and United Bristol Hospitals. Only two respondents provided oral evidence only.

Visits to hospitals were undertaken for the purpose of finding facts to supplement the survey of opinion. These visits resulted in useful knowledge of administrative practice in different hospital groups and provided an opportunity to discuss with senior nurses.

The statistics division of the Ministry of Health conducted a census on behalf of the committee. The inquiry was addressed to all staff in post in National Health Service hospitals in Great Britain in the grades above midwifery sister, ward sister, and charge nurse; to all midwifery sisters, ward sisters, and charge nurses in one-third of the nonteaching hospitals in England and Wales, and Scotland; and all teaching hospitals in England and Wales. The questionnaires were sent to group secretaries and house governors who were asked to enter the names and Whitley grades of appropriate staff. The nursing heads handled the distribution to the staff. The purpose and confidentiality were noted. The overall response rate was 85 percent. The census obtained data in the following areas: • groups used in the inquiry—kinds of hospitals included; • the number of staff, their country of birth, whether whole time or part time, and whether married; • the age of the staff; • the number of staff who will reach retirement age within 10 years; • the length of time spent in the current grade; • years of service between appointment as ward sister/charge nurse and or matron/chief of qualifying SRN and whether trained in teaching or nonteaching hospitals; • educational qualifications; • tutorial and midwifery qualifications held by matrons; • administrative courses; • matrons who were heads of training schools and deputy matrons answerable to matrons; • breaks in nursing service in hospitals; and • matrons who moved from one hospital to another.

In the tables giving the findings from the inquiry the figures for midwifery sisters, ward sisters, and charge nurses in nonteaching hospitals in England and Wales have been multiplied by three. In Scotland, all figures for those grades have been multipled by three. Much factual material derived from past work study was made available by the National Health Service Central Organization, Methods Unit of the Ministry of Health, and Ministry of Health's Standing Nursing Advisory Committee. The Nursing Committee made available material collected on post-certificate training and education of nurses and a recently completed first report relating to registered nurses in general hospitals.

Results.—The scope and structure of nursing administration in the past, present, and a proposed pattern for the future is described in chapters 2 and 3. Chapters 4 to 8 consist of exploration of jobs of senior nurses in the various grades under the proposed staffing structure and roles of committees and conferences in relation to nursing. The recommendations for the selection and preparation of nurses for administrative work are contained in chapter 9. Suggestions of how proposals can be carried into effect are the content of chapter 10.

The outline of the report in chapter 1 is concerned with the partnership of nursing with medical and lay administration. The assertion of the professional status of nurses could best be achieved by assuming the right to be heard (sapiential authority) on all matters concerning nursing that are controlled by governing bodies. To present those governing bodies with the profession's concept of nursing policy and to decide that policy, the status of the most senior nurse administrator in each hospital group must be raised.

In reviewing the present staffing structure and grades, confusion arises from the indiscriminate and imprecise use of the title "Matron." The tasks and responsibilities of the assistant or deputy matron of a large hospital may be the same as those for a matron of a small hospital, but the status and prestige is associated with the title. There is confusion about the functions of nurse administrators, least for the ward sister, more for the matron, and most for nurses in the intermediate grades. Matrons tend to hold on to tasks that could be carried out by other nurses or well-trained clerks. Few matrons practice the technique of delegation or decentralization. Difficulties arise from traditional and widely differing beliefs on the relative status of administrative nurses in general and those in teaching and midwifery. There is a feeling that psychiatric nurses and midwives are a nursing world apart.

The proposed structure includes a decision to separate nursing policy from programing or executing the policy. Those who decide policy, the most senior officer, will be called "top management," those who program policy, "middle management," and those who control the execution, "first-line management." If a small hospital is properly integrated within a group, the policy decisions should be made by the controlling or coordinating head nursing officer. The matron of the small hospital should be delegated tasks of middle management. In a large hospital, the staff nurses and their tasks are coordinated by the ward sister or charge nurse who is in charge of a "section." A logical grouping of sections is a unit, the authority belonging to a nurse in middle management. A grouping of units, an "area" is coordinated by a more senior middle manager. Areas and units are brought together in a "division," the authority belonging to a nursing officer in top management. Possible divisions are three—nursing, teaching, and midwifery. The organization of nursing posts can be numbered in grades from 10 for the most senior nurse in top management to 5 for the staff nurse who executes the program. The numbers 4 to 1 are applicable to grades below staff nurse. The term "nursing officer" can be applied to male as well as female nurses. Prefixes such as "assistant" and "deputy" are confusing and do not indicate the nature of a job.

The chief nursing officer (grade 10) may have either full or actual control or may coordinate by the use of sapiential authority (the right to be heard by reason of knowledge or expertness). The use of sapiential authority is the essence of the process of secondment. Secondment is the process by which nurses can coordinate the activities of persons under the control of the hospital administrator; persons who can carry out many of the tasks now performed by nurses that are not properly nursing. The principle of secondment is described in the appendix and illustrated by the case of the domestic assistant (cleaner) who does cleaning in the wards. The definitions of role, the scope of cleaning, and the lines of responsibility are described in detail.

The implications for nursing careers based on the proposed staffing structure are extensive. At present, there is limited scope for promotion, which proves little incentive for highly competent nurses to stay in the profession and disheartening for those who do. The addition of steps toward the top of the promotion ladder as well as widening of lower ones will permit more frequent, evident, progress upwards in status—reward for work well done. The recommended structure may also allow individuals in senior managerial positions to see that they can be of greater importance in service to more patients rather than "to the patient." For highly skilled nurses who do not have managerial capabilities, there can be promotion to grade 7 in control of a specialized unit. The recommended structure is suitable for advancement of nurses according to the manner in which they serve in their profession—in specialized nursing, in nursing administration, and in teaching. Nurses in top management need well developed managerial skills and should not be required to have a basic qualification in each kind of nursing represented within their sphere of authority.

Job descriptions for positions in all grades from staff nurse to chief nursing officer are provided. Descriptions illustrate the principle of delegation and decentralization. The tasks specified are • professional—those dependent upon knowledge of nursing, • administrative or management—those concerning the ordering and coordinating of jobs and people, and • personnel—those concerned with the welfare and morale of staff. Job descriptions are guides, to be used as models by nursing offices in analyzing the jobs of their juniors. Job specifications can lead to better organization and better communication and there is some evidence to show the result is likely to improve patient recovery.

It appears to the authors of the report that there are too many decisions made by nursing committees that would be better formulated through the use of informal consultative techniques. Meetings should be defined and purposes of meeting clearly specified whether for consultation or decision. Organized conferences will enable all grades of nursing staff to contribute of their personal knowledge towards better nursing decisions.

A broad scheme of systematic education and training for promotion upwards through first-line to top management is described. Complete reliance upon external courses is not the solution. The best education and training is "on-the-job," a constant process that is the task of every superior and a duty owed to the junior. The establishment of a regional nursing staff committee with the functions of ensuring appropriate courses for first line and middle management education and providing a parallel of assessors for appointments to posts in grade 8 and above is recommended for each region. General and psychiatric nurses, teachers, and midwives should undergo the same managerial education and together. Joint education for the top posts will mold all nursing into one nursing profession.

In order to carry out a scheme of progressive implementation, a program of five steps is proposed. Ideas from this report must be presented in an organized fashion. Existing organization must be reviewed. Jobs are to be re-constituted according to job descriptions. Officers for the highest posts must be educated and prepared. Pilot schemes must be tried in one or two groups in each region prior to extension throughout the region.

Chapter 2 presents a historical review of nursing administration. The trend in the purposes of hospitals has been from custody of the infirm or user to their care and, finally, to their treatment and cure. The points of emphasis are Before Reform, Florence Nightingale and Reform, After Reform, Development of the Pattern of Organization, and Development After 1948.

Chapter 3, entitled "Future Pattern of Nursing Administration," reviews present arrangements for nursing administration and considers the factors that influence its development. The changes in managerial organization are likely to be brought about as a consequence of the hospital plans. Hospital management, the hospital plans, administrative nursing links between hospitals, the sphere of authority of the nurse administrator, delegation, the new staffing structure, job description and job analysis, and note on the grades are considered.

In first-line management, nurses order and coordinate others in caring for patients and they personally nurse patients. Two grades in first-line management are staff nurse and ward sister. Existing grades equivalent to grade 6, present job of the ward sister, job of the charge nurse, future developments, and definition of grade 6 are described in detail.

Middle management nurses order and coordinate other nursing staff in caring for patients but do not normally give direct nursing care. Their jobs consist of working out nursing care plans by determining the nursing procedures and activities and the staff required to do them. There is a tendency to place emphasis on training and allocating staff rather than on how to make the best use of staff. This chapter suggests ways in which the staffing structure can be improved. A table shows existing grades approximating middle management. Present use of some intermediate grades is discussed as well as defects of the present system. The new structure is described. There will be relief from nonnursing duties. The jobs of the nursing officer (grade 7 and 8) are defined and described in detail. The criteria for instituting those posts are developed.

Top management nurses formulate nursing policy at the national and local level. In a fairly large hospital group, the functions of organizing nursing care and nurse training require attention of the top level management nurse. Channels of responsibility and communication between nursing heads of hospitals and governing bodies were considered. There is agreement that the nursing administrators of very small hospitals were best associated with large hospitals of the same type. There is need for flexibility in discharging top-management functions in nursing. The existence and limitations of top management in nursing is considered. The new structure is proposed. The jobs of the nursing officers in grade 9 and grade 10 are defined and described. The criteria for each are explained. Regional hospital board posts in grade 10 are discussed.

The content of chapter 7 is the application of the new structure to midwifery, psychiatric nursing, and nurse education. Although the new staffing structure has been devised to accommodate posts in all branches of nursing, because of special characteristics control must be decentralized and delegated.

Chapter 8 is entitled "Committees and Conferences." Present practice and views are centered primarily on the question of what committees nursing heads should attend. General considerations are the lack of definitions of committee and conferences, directive committees for nursing, executive committees, and conferences.

The preparation and selection of individuals for positions in the new staffing structure are of strategic importance. In this chapter, the present arrangements for selection and preparation are reviewed and certain proposals are suggested.

The recommendations based on this report are numerous. There are 49 recommendations that comprise a summary of the entire report.

Critique

Changes in modern hospital, medical, and nursing practices have necessitated the reevaluation of nursing administrative practices. Investigative efforts most frequently are concerned with improving nurse utilization and supervisory methods. The rationale presented by Salmon and his committee for this study is concerned with the status of the nurse in the hospital organization. His rationale is sound, for the nurse must be heard in the organizational milieu if the best interests of the nurse are to be maintained.

The purpose of this study is to consider whether the present structure of the senior nursing staff (ward sister and above) and scope of their administrative and managerial work need modification in light of modern hospital methods and to advise on the senior staff structure in the hospital service.

The theoretical framework of the study is only partially developed. The literature review is lacking. A historical review is outlined and a glossary of terms included.

The survey methodology is employed. The development of questionnaires used in the collection of data is not described. Tests of validity and reliability are omitted. Samples of questionnaires are included in the appendixes. Only findings of the "statistical inquiry questionnaire" are reported in the appendixes. Data involving opinions of hospitals and organization administrative personnel are collected orally as well as in writing. Data are also collected through units to the study hospitals. No information is provided in regard to methodology or instruments used in the collection of these data. Factual information made available by the National

Health Services Central Organization and Methods Units of the Ministry of Health is not included. Data secured through statistical "Enquiry questionnaire" is applied throughout the study. Application of the elicited opinions data and secured factual information in the staff structure changes is not defined. It appears that the staff structure changes were based on the committee's opinions rather than the elicited opinions. Rationales for the changes are included. Position descriptions for all levels of personnel are included in the appendixes.

The "statistical enquiry" questionnaire eliciting information from midwifery sister, ward sister, and charge nurse in one-third of nonteaching hospitals in England and Wales and of teaching and nonteaching hospitals in Scotland and all teaching hospitals in England and Wales included questions in the following general areas: • kinds of hospitals included; • number of staff, their country of birth, whether whole time or part time, and whether married; • age of staff; • number of staff who will reach retirement age within 10 years; • length of time spent in current grade; • age at appointment to current grade; • years of service between appointment as ward sister/charge nurse and or matron/chief male nurse; • statutory nursing qualifications; • age of qualifying SRN and whether desired in teaching or nonteaching hospitals; • educational qualifications; • administrative courses; • matrons who were heads of training schools and deputy matrons answerable to matrons elsewhere; • tutorial and midwifery qualifications held by matron; • breaks in nursing service in hospitals; and • matrons who moved from one hospital to another.

The questionnaire submitted to organizations and hospital authorities asked for information in regard to • content of nursing administration, • head of nursing and education services, • senior supporting staff, • other senior staff (line managerial), and • preparation of staff for administrative posts.

The samples are unusually large for the study of the numbers and kinds of variables involved. This is the innovative feature of the study.

The value of this study lies in the formation and presentation of guidelines for a nursing administrative position to be used in hospitals. It should be useful for nursing and hospital administrators wishing to assess and readjust administrative staff functions. The study appears to be large and comprehensive using well qualified personnel in its execution. It is unfortunate that there was not complete reporting of the more scientific aspects of the study. Lack of information makes a proper evaluation of the study impossible, so that its contribution to nurse staffing research design can not be determined.

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A58. Saren Martin, and Straub, Anton J. "A Final Report on the Study of Hospital Costs in New York State." Conducted for the State Department of Health, 1966-69. Submitted by Columbia University School of Public Health and Administrative Medicine to Commissioner of Health, New York, 1969.

Review

Purpose.—This final report consists of • summary data with respect to hospital costs in New York State from 1957 through 1967, the continuing study of nursing services for the purposes of developing better cost indices and criteria, and a review of mechanisms now in process to improve the efficiency of hospital operations.

This project was concerned with manpower utilization and its measurement. "Nursing services were used as a study focus since, as a function, it represents the largest proportion of hospital costs and to date, has resisted meaningful cost analysis and measurement." The report is divided into sections, the second of which is concerned with a series of studies in nursing services. Many sources of information basic to this study were destroyed by fire in 1968.

Section 1. *Trends in Hospital Expenditures and Patient Day Costs*

Data were taken from previous reports "Prepayment for Hospital Care in New York State" and "Report of the Governor's Committee on Hospital Costs" based on HE-1 financial and statistical reports made by hospitals to the Department of Social Welfare. In all, 232 general acute hospitals in New York State were used.

The categories chosen for study of hospital expenditures were (a) professional services; (b) dietary services; (c) housekeeping, laundry, and maintenance services; and (d) administration and general services. The professional services category includes such general areas as nursing care (including nursing education), medical and surgical supplies, drugs, medical record keeping, medical social service, and interns' and residents' expenses. Special professional services include maintaining operating rooms, delivery rooms, blood banks, and diagnostic and therapeutic services. Administrative and general services include salaries and other costs incurred in maintaining the executive staff, accounting and business offices, admitting offices, telephone services, purchasing and storekeeping, insurance coverage, personnel programs, and interest.

Summary data concerning inpatient hospital facilities according to region are presented in eight tables: • there is an increase in number of available beds, • there is a continuous increase in patient days, • rate of increase in admission is declining, • percentage of occupancy has increased; • newborn occupancy has steadily declined, • average length of stay has increased, • rate of occupancy and length of stay is greater in larger hospitals, and • rate of hospital admissions by region is indicative of economic factors.

Four types of measurement of financial data are used: total dollars expended, average per diem costs, average cost per hospital stay, and average cost per hospital bed. The data, relating various costs to certain regions, are presented in 26 tables. There is no adjustment for variations in patient mix, age, socioeconomic background, local medical practice, or varying availability of beds.

Section 2. *Improving Management Effectiveness in Patient Care Services:* A Feasibility Study Involving Nursing Services.

"To measure performance in nursing care service, we need to be capable of measuring the application of personnel time to the workload (satisfaction of patient need)." Other factors that affect performance are physical layout, equipment, medical staff practices and attitudes, and departmental organization. "The basic equation in performance measurement, however, involves staffing and patient needs."

Measurements used to represent quantity performance are direct cost of nursing service per patient day, nursing service man-hours per patient day, and the nursing service man-hour per bed per day. Approaches useful for obtaining reliable indications of quality are use of expert judgment and setting of a quality index based upon repeated observation of certain attributes associated with quality of nursing care.

A. Management Control in the Utilization of Nursing Personnel

Purpose: To indicate utilization and nursing personnel. "The problem is particularly acute in nursing services, which is the largest consumer of the hospital dollar, and where problems of personnel shortages, turnover, absenteeism, and patient complaint are rampant."
Sample: Six Long Island Hospitals.
Method: The study staff of Columbia University's School of Public Health and Administrative Medicine conducted an indepth review of nursing personnel performance in the spring of 1967.
Findings: "The study provided a statistical base and an opportunity to observe actual practices that indicate the need for serious reevaluation of nursing organization and practices."

Nursing staff are confused by the professional leadership who themselves are in conflict about the proper role of nursing personnel.

"It is the contention of the study group that hospital administration has an important contribution to make in defining the organization, function, and activity of the nursnig service in the hospital."

Findings were used as a basis for statewide institutes or the "Use of Nursing Time—It's Measurement and Cost Implications."

B. Staffing-Workload Relationship

Purpose: To examine the relationship between staffing and workload as based on Richard C. Jelinek's "Measuring Performance in the Patient Care Services," an unpublished paper, June 4, 1969.
Sample: Three hospitals.
Instruments: Workload is based on the number of patients on a patient unit. A more sophisticated measure is based on the classification of patients into categories reflecting the need for care. "A workload index is derived by a simple formula utilizing the number of patients falling into each of the categories." This index, used in this study, is based on Connor's work.
Results: A chart, included in the introduction of this substudy, shows no relationship between staff and workload. "If anything, a relationship that is associated with an entirely undesirable situation—increasing the staff as workload decreases—is ob-

served." There are similar results if number of patients is the only indication. There is this same similar result if the entire staff size or the staff size for each kind of personnel is used.

The relationship illustrates the lack of management control. A number of procedures to control this relationship are proposed. Those include the selective placement of admissions of patients and the formation of a centralized "float" nursing staff.

Patient rating methods were refined by the study staff. Categorization based on weighted values assigned to an individual patient's nursing care needs was labeled "units of service." These values, reflecting the time necessary to carry out nursing functions, were based on rating techniques developed at the School of Public Health of Yale University. These "units of service" represent 90 percent of total direct patient care activity. The classification or "grades" of patients include five levels in an attempt to establish a measurement system that would reflect care needs that indicate the appropriate staff levels.

A survey showed that, in three study hospitals, 60 to 74 percent of all patients were in "grades" that could be cared for entirely by auxiliary nursing personnel under professional supervision.

C. Possible Control Data Application

Purpose: To show how the methodology of patient rating could be utilized in refining cost and manhour utilization measurement.
Sample: Five hospitals.
Instruments: Patient needs are assigned numerical values reflecting time required to prefer a particular nursing function and labeled "units of service."
Procedure: The units of service are related to hours actually worked on the study units. The units of service are related to salary expense reflecting the variation in staffing positions. "This ratio produces a nursing unit of service cost that is reflective of patient needs and the expenditure per unit of service required to satisfy these needs."
Findings: The hospital that reports the lowest per diem nursing service cost has the least effective use of personnel when patient rating is included.

This form of measurement comes closer to focusing on several of the major variants in nursing service costs. It is suggested that economy of operation reflects good management, work satisfaction, and high morale.

"Patient care needs and staffing are statistically and reliably related, particularly over an extended period of time, for purposes of administrative-professional evaluation. . . ."

D. Task Reassignment by Skill Levels

Samples: All bedside care services during the study period or each patient on the study units at one hospital.

All the special care task functions on two similar nursing units, during a 7-day study, expressed by skill level and time of day based on Community Systems Foundation data.
Instruments: Work sampling and direct continuous patient observation techniques.
Procedure: "Each activity performed was reviewed by professional nurses without reference to what traditionally has been regarded as professional or nonprofessional activity." These activities were reassigned to those capable of performing the same tasks at the least skill level required.
Findings: Except for passing of medication and a small number of special and high skill functions, all other activities could be reassigned to auxiliary nursing staff. Direct registered nurses' hours required were reduced drastically.

E. Timing of Activities

Sample: One of six study hospitals typical of all the hospitals studied.
Instruments: Work sampling technique.
Procedure: The percentage of total activities are distributed for day, evening, and night shift indicating direct, indirect, personal, standby, meals, and coffee break activities spent by all assigned personnel for the entire study period.
Results: Direct and indirect patient care activities range from 50 to 60 percent.

There are peaks and valleys of both direct (patient care) and indirect (charting and communication) activities relating to tradition, timing of doctor's visits, and demands related to dietary, housekeeping, messenger and transportation. "These peaks and valleys, which account for 90 percent of total activities, graphically demonstrate the unplanned nature of the provision of nursing care."

Redistribution of nursing activities reduces staff requirements as documentation by the Systems Improvement Program of the Hospital Educational and Research Trust of the New York State Hospital Association.

A list of reassignable tasks are included in an addendum of this report.

F. Quality Appraisal

Purpose: Administration should participate in development of indices for appraisal of quality of care. These indices should concern ability to recognize need for and degree of care required, waiting time for the service, skill in accomplishing a certain task, and empathy for the patient.

Sample: Fifteen hospital administrators from different parts of the country.

Results: A list of 16 criteria deemed most useful in determining quality of nursing care services. The characteristics of a good quality appraisal mechanism are reliable measurement, time limitation, acceptable criteria, precision, weighted factors, and variables.

G. Computer Application/Analysis and Control of Nursing Services

Purpose: To contribute to the expansion of performance measurement systems.

To inquire into the nature of nursing service care from the viewpoint of nursing personnel employment and utilization.

Instrument: The Catholic Medical Center of Brooklyn contributed the services of a computer organization.

Procedure: The head nurse prepares a patient care plan for each patient on the study unit as though there were sufficient staff to provide the degree, skill, and scope of services need for quality (not luxury) care for each patient. This provides a subjective parameter to measure performance and serves as a tool for the development of the head nurse's role as the professional care unit manager.

Results: Procedural document entitled "Measurement of Patient Nursing Needs Unit Activities for Medical/Surgical Units." The document details procedures for patient rating and appropriate forms used to code and keypunch data. Similar information is available for work sampling and continuous patient observation. By relating this information to standard time data, the amount of staff time directed to various direct patient care tasks and skill levels at which performed become available for analysis.

This daily control system attempts to effectively allocate personnel to meet daily changes in the demand for care. The computer system can assist the nursing service office by assuming the reallocation function. The system stores information concerning the work schedule for all staffing preference, minimum staff requirements, and patient conditions on each care unit. This information is used to determine the workload on each unit and to assign base staff and float nurses.

H. Strengthening Unit Management.

"Work sampling clearly established the fact of planned activity on the units studied." In practice, the head nurse was preoccupied and diverted by many intervening factors leaving no time for patient care planning, management, and coordination. "Except for the most acutely ill, the head nurse had little contact with patients and her personnel assignments seemed, in the main, to be intuitive, and conditioned by her impressions of need rather than by objective appraisal."

The study staff is convinced that the head nurse (unit administrator) assumes much greater authority and responsibility for her unit. It is her responsibility to provide a continuum of sound management practices 24 hours a day in order to provide good inpatient care and economical use of personnel and other resources. The highest authority on the unit should rest with a management oriented nurse.

The data and analysis systems (previously described) are to be used as tools in the management development program and as daily aids in the planning, control, and evaluation function.

Addendas Basic to Study of Nursing Services

A. Quality Control Plan For Nursing Service

Purpose: "This report describes a plan for determining the relative level of patient care based on statistical quality control methods. It is the result of intensive research and pilot studies by nursing and engineering professionals in a number of hospitals."

Hypothesis: Direct inspection of the patient and his immediate environment, plus a thorough review of his clinical record, will provide information regarding the quality of care being given.

Instrument: The plan is based on sampling within a nursing unit. The plan requires five of the three checksheets to be filled in during each control period (1 to 4 weeks). Times for making these observations are based on an established random schedule.

Sample: To insure validity during the control period, it is essential that a sufficient number of samples have been taken. If the percentage of yes ratings is between 50 and under 90 percent, the number of additional checksheets required range from 20 to one.

Procedure: It is recommended that the observing and rating be performed by members of nursing administration and/or supervisory nurses from units other than those to which they are assigned. These persons should be adequately trained. The recommended procedure for observing includes the use of the established random schedule and the use of checksheets. The immediate prevailing condition should be checked. The nurse in charge may be used for consultation. All negative ratings should be supported. Fourteen ratings should be checked for each room/patient.

Due to the greater objectivity involved in the inspection and ratings of patient charts, staff nurses may perform this function. They should receive adequate training. A general procedure is outlined. The last two complete days are inspected and rated, referring to kardex and medication cards as required.

The observing and rating of the nursing unit should be performed by members of nursing administration and/or supervisory nurses. Adequate training is necessary. The immediate prevailing condition is rated.

Results: The completed checksheets are analyzed by Community Systems and control indices are computed. The reports include a documentation of the performance of each unit with specific problems defined.

B. Other Addendas

Other addendas include the Patient Rating Sheet, Procedure for Work Sampling, Checklist of Activities by Staff and Head Nurse, Direct Patient Care Activity, Tables and Graphs of Nursing Activity at St. Mary's Hospital, and Diagram of Nurse Scheduling Control.

Six institutes entitled, "Use of Nursing Time—Its Measurement and Cost Implications," were held in New York in 1968. The attendance at each of these meetings is analyzed. Analysis of answers to questionnaires sent to registrants at three of the institutes are presented.

A partial list of improvements in work distribution and procedures based on CSF is presented.

Progress for Cost Effectiveness

Hospital mergers, shared services, incentive programs, and management data control systems were examined in order to assess the possibility of bringing about greater cost effectiveness. However, much of the data were destroyed by fire. "Furthermore, the data that were available prior to the fire did not provide convincing documentation as to the success or failure of the various programs."

General observations can be made about the various programs. Experimentation with various forms of new management approaches is increasing. There seems to be a lack of understanding of an economically coordinated-intergrated health system. There is a need for national, or at least regional, planning and direction. There are little data upon which to make reliable cost evaluation in these very new programs.

Critique

Cost of hospital care is a real and urgent problem. The search for methods of reducing hospital cost and improving patient care quality continues as social pressures are increasingly exerted on hospital administration. Saren and Straub present us with the final report of one of the major hospital cost studies. Not all data are included, which places some limitations on the assessment of the study.

The report is well written, well organized, and readable. Four hospital areas are selected for study: • professional services, • dietary services, • housekeeping, and • administrative and general services. Nursing services were used as the study focus since it represented the largest proportion of hospital cost.

The theoretical framework of the study is only partially developed; literature review and bibliography are not included in this report.

Samples of the instruments employed in the study are included. Their development is briefly described or lacking. The investigation drew from the works of the CSF, Jelinek, Connor, and the staff of Columbia University's School of Public Health and Administrative Medicine in developing assessment methods and instruments. The samples used in the study are large.

The application is primarily that drawn from engineering methodology. The engineering attitude is seen in the assessment of variables studied.

Quality of care is assessed by direct inspection of the patient and his environment and a review of his clinical records. Assessment of the patient's emotional needs and satisfaction is ignored. The assignment of numerical values to patients' needs is questionable since patients' needs cannot be based solely on the physical needs, nor can the proficiency of nursing personnel be based solely on the number of procedures carried out, as it was presented in this study. The method used in the reassignment of nursing tasks by skill levels is deficient. In task assignment, the specific requirements of patients must be given first consideration.

The weaknesses of the approaches, therefore, reside in the logic used. However, this study does provide us with a well outlined description of the amount of work that was being accomplished in a large number (232) of hospitals in the New York area. While the highly mechanized procedures used in the study will be of interest to persons considering hospital costs, the overall impact is questionable. For this reason, the study does not contribute greatly to nurse staffing research design, other than to raise questions about how one can logically study the problem. For example, turnover of nonprofessionals is ignored. Training and induction costs are not considered. The quality program is not directed toward recovery. So, although the study is commended for its look at the matter of cost, a great deal of information about pertinent variables is lacking.

A59. Schweir, Mildred; Musiker, Harold R.; and Gruen, Walter. "The Nurse Leader Role and Its Impact on Care." Summary Chapter of Final Report, USPHS Grant No. 00712-01, Rhode Island Hospital, Providence, Rhode Island, March 1970, (unpublished).

Review

This report is the final chapter of the book that is to be printed, describing a major reorganization of the supervisory nursing service at Rhode Island Hospital, Providence, Rhode Island, and the research project carried on in conjunction with the change. The aim of the research was to test • the impact of the introduction of the unit manager system as an experimental variable, and • the impact of the joint introduction of the unit manager system and the nurse leader system as an experimental variable.

In the attack on the problems of the service, these two changes were used. The unit manager system was designed to have jurisdiction over one unit of 40 patients and to perform functions concerned with management of all clerical activities, supplies and equipment, housekeeping, environmental control, and transportation and messenger service. The nurse leader system was described as follows:

- elimination of the positions of coordinating supervisor and of head nurse;
- establishment of a nurse leader position per floor of 80 beds. The individual filling this position had the responsibility for nursing staff and for directing the care required for patient needs;
- conduct of an elaborate retraining program for the nurse leaders and nursing staff;
- division of each floor of 80 beds into four units of about 20 beds each. An assistant nurse leader and her relief were appointed to head each nursing unit;
- appointment of an assistant nurse leader for the 80 beds on evening and night shifts.

The research study was set up to test specific hypotheses that fell into three categories:

- the nurse would spend more time in direct patient contact;
- the nurse would show greater concern for involvement with the patient and his family and consider him as an integral part of the care system, so that the patient in turn would show significant changes in attitude and behavior; and
- the nurse would develop initiative in patient-oriented care.

The design of the study included a field test study and a two group study, one unit designated as experimental and the other as control. The introduction of the experimental variable was introduced with before-and-after testing. A medical unit served as the pilot area for the tryout of the nurse leader system and for the test of instruments for measurement.

Two surgical nursing units served for the study units. On one of these units, the sequence was as follows:

- a reading of variables—3 months' time;
- introduction of unit manager system;

- 4 months later, a reduced reading of variables;
- introduction of nurse leader system; and
- final reading—15 months after beginning of study.

On the second unit, the sequenee was:

- a reading of variables;
- introduction of unit manager system;
- a repeat reading of variables in 12 months after the first reading; and
- there was no mention of introducing a nurse leader system.

Over 140 psychological instruments were devised to measure variables related to the hypotheses. The instruments were used with patients and nursing staff. Also employed were interviews and observation. The final chapter included no examples of these and no report of reliability and validity.

The results were supportive of the hypotheses. Changes occurred in both nurses and patients. The authors state that results "are documented by stringent tests of statistical significance."

The authors state that "the introduction of the unit manager system alone produced consistent changes for the worse. . . . It was only after the nurse leader system was installed, in conjunction with the unit manager system previously, that significant changes described occurred."

Critique

This summary chapter was sent for preliminary review through the courtesy of the investigators. The contents of the final chapter give the impression that this will be a highly significant report. However, because of the brevity of the chapter and the nature of it, one cannot evaluate the rigor and soundness of the research that is described in summary form.

A60. Scottish Health Service Studies No. 3. *Nurses' Work in Hospitals in the North-Eastern Region.* Scottish Home and Health Department, 1967.

Review

Purpose.—This project was to take the form of an inquiry to establish factual information on the workload of nursing staff in all wards and departments of hospitals in the region.

The aim of the project was to establish appropriate staffing where possible considering factors such as:

- structural and architectural features of the various hospital buildings, and the effect of ward layout on the nursing workload;
- particular staffing problems due to local circumstances; and
- those conditions not within the control of nursing staff but affecting the nursing workload.

Objectives.—

(a) to undertake investigations of specified departments of selected hospitals in the region to determine the nursing workload.

(b) to identify duties and responsibilities appropriate to various grades of nursing staff.

(c) to investigate ways of reducing nursing staff workload, either by introduction of new methods, procedures or techniques or by delegation to nonnursing staff.

Samples.—The study sample included 46 wards, five theaters (operating rooms), and two outpatient departments in 13 hospitals in the northeastern region of Scotland. Seven nurse observers were employed to collect the data.

Method.—Data were obtained through a work study, a technique of activity sampling, which was designed to enable the keeping of a permanent record of the activities of members of the nursing staff at the time of observation rounds. Information about the ward and the unit in the hospital and about the hospital as a whole was obtained by the use of questionnaires answered by the ward sisters and matrons. In addition, ward sisters were asked to keep daily records of the numbers and types of patients in their wards and to classify them under one of five headings, varying from "totally helpless" to "fully ambulant." Examples of the categories of work activity, questionnaires forms, and the five patient classifications are contained in the appendix. For the location studied, a 3-week cycle was adopted that consisted of a few days of familiarization for observer and staff, 7 full days of study, and time for a preliminary analysis of the results obtained. The activity sampling was carried out on the basis of an average of five rounds per hour. By random selection, 60 observation times were decided upon for a 12-hour period, the individual times being always 5 minutes or more apart. Fourteen such 12-hour blocks of 60 random times were made for each 7-day study period. The 3-week cycle was repeated nine times. Over each 7-day study, 2,275 observations were recorded. On this basis the accuracy of the survey was stated as:

> "On an element that occupies 2 percent of the total time there is an 80 percent confidence level; that this figure of 2 percent is within the limits of accuracy of plus or minus 0.37 percent. Where the total number of observations varies up or down from this figure of 2,275, the confidence level or the limits of accuracy will vary accordingly."

Analysis of the data obtained from the study resulted in the development of a formula for the calculation of the day duty nurse staffing requirements for any ward, with provisions made for the type of hospital, ward specialty, and size and layout of the ward. As the formula developed had not been studied to identify its effect on the actual nursing care received, the formula was not given in the study report.

The authors identified five factors that affected the amount of staff time spent in the areas of basic nursing, technical nursing, administrative duties, domestic work, and miscellaneous functions. These factors were:

- ward specialty,
- administrative methods employed on the ward,
- amount of domestic work done by the nursing staff,
- coffee and tea break policies, and
- night staff duties.

The appendixes contain many tables giving data concerning percentages of time spent by staff in basic, technical, and administrative nursing functions, domestic work, and miscellaneous responsibilities. The authors' conception of duties appropriate to various grades of nursing staff and criteria for acceptable standards of basic nursing care for helpless patients also appear in the appendix.

Critique

This survey was undertaken to describe the nursing workload on nursing staff in this particular region of Scotland. Only a brief statement is given in reference to the need for the study.

A standard survey approach, utilizing questionnaires and work activity samplings, was used. This survey drew upon a previous one carried out at Woodend Hospital, Aberdeen, which used activity sampling. The development of the listing of duties and their placement into categories, the patient classification system, the selection and training of observers, and the development and testing of the questionnaires were not reported in detail in this study. Neither was there a reference as to the sampling technique of the wards, theaters, and outpatient departments used in the study. The reader does not know, for example, whether the ones used were randomly selected or selected on criteria enabling stratification of types of nursing units. The treatment of the data is simple: numbers, in percentages, subtotals, and totals. The variables built into the tables are many: • type of nursing by category of task; • number of observations, percentage and amount of time devoted to it, • clerical nature of unit, • level of personnel, • male and female nursing units, • number of pupils, etc.

The fact that there is no evidence that the data are reliable and valid or that the sampling was adequate limits the value of the study. However, this study is referred to in the Scottish Health Service Studies, Bulletin No. 9, *Nursing Workload per Patient as a Basis for Staffing* and provides the basic documentation for a staffing approach.

An innovative feature of this study is the patient classification system that uses two dimensions of patient care requirements: ambulation and self-help. The use of ambulation ranging from fully ambulant to bedfast/chairfast is suggestive of Simon's studies of activities of patients. Helplessness refers to the lack of ability of the patient to care for himself in personal services: feeding, dressing, and toileting. The continuum along which these two have been developed is logical. This system may have application for testing in geriatric settings in the United States.

A61. Smith, Joyce G. "An Investigation of Interruptions in Nursing Care." Final Report, (GN 5363), Montefiore Hospital, Bronx, New York, April 1958-August 1961.

Review

Problem.—To study interruptions encountered by nursing personnel in their daily activities on nursing units.

Assumption.—That interruptions may affect the nursing staff adversely and ultimately the care they provide to the patient.

A research committee was created. This included the Investigator (chairman), Nursing Executive, Educational Coordinator, Assistant Hospital Administrator, a Statistician, and later the Assistant Nursing Executive.

Setting.—Montefiore Hospital, the Bronx, New York City. A 674 bed, voluntary, nonprofit general hospital accredited by the Joint Committee on Accreditation of Hospitals (JCAH). Surgical, medical, neoplastic, neurological, neurosurgical, pulmonary, psychiatric, rehabilitation, pediatric, and psychosomatic and social medicine services are available. It has an active intern and residency program and a program for affiliating nurses. Fifteen supervisors, 22 head nurses, 126 staff nurses, 179 practical nurses, 124 attendants, and 17 ward clerks are on the staff.

Literature is reviewed. A functional analysis of nursing service (University of California School of Nursing, 1950), Marion Wright's *The Improvement of Patient Care,* and *Head Nurse Activities in a General Hospital* (Public Health Monograph 3, 1950, U.S. Public Health Service Publication No. 107) are quoted in justification for this study.

Terms and limitations are defined. The term "interruption" is defined for the purpose of this study as "any situation that occurs while the nurse is actively engaged in carrying out her plan for patient care and that is an obstacle to her doing so."

The daily assignment method for personnel is described as the modified functional method. Details of this method are discussed. Underlying concepts are:

- nursing staff are assigned a selected number of patients,
- the goal of each member of the nursing staff is to provide care for her selected patients, and
- various situations can occur to prevent the nurse from achieving her goal.

Limitations.—The study is limited to identifications and measurements of the interruptions encountered by nursing personnel who were actively engaged in carrying out a patient care assignment. The investigator (who functioned as a staff nurse), four registered nurses, and two practical nurses "had to be doing something for assigned patients for an interruption to occur."

Their project was limited to an intensive study of one group of interruptions found to occur frequently. "Nature" and underlying causes for interruptions concerned with equipment and supplies were studied.

The extent to which a particular type of interruption disrupted nursing care plans is not studied.

The data represent only interruptions during the day shift, Monday through Friday.

Methodology.—Various levels of nursing personnel were observed by the investigator as they were giving bedside nursing (direct care), giving medications and specialized or complicated treatment. From these observations, situations where procedures could not be completed were described. These observations were reviewed by the committee. It was noted that some situations hindered the nurse within her functions (delays) while other situations took the nurse out of one situation into another (interruptions). Types of obstacles encountered were used for classifying events on a checklist.

Three patients were assigned to the nurse for two consecutive days. Each third patient, as his card appeared in the kardex, was assigned to the investigator. Twelve patients were used in the pilot study for the study of bedside care.

The investigator functioned as medication nurse and treatment nurse for 2 days each and recorded interruptions and delays.

The committee reviewed the collected material and clarified the area for study and methods for collections of data. It was decided that only interruptions occurring during bedside care activities would be studied since they were observable and could be identified as to type.

Interruptions and delays from the pilot study were categorized and combined to form a checklist of 47 items with space for recording. This form applied in the study of the four nursing units.

Each nursing unit staff was oriented to the general study requirements and project purpose. Checklists were not shown prior to the actual study.

The investigator functioned as a staff nurse on each of the units. Each third patient was selected from the kardex until 24 patients from each unit had received two consecutive days of nursing care by the investigator.

Variables.—Data obtained on patients included: (a) name, (b) room number, (c) number of beds in the room, (d) hospital number, (e) age, (f) sex, (g) service, (h) admission date, and (i) dates of care by the investigator. Patients were classified as to degree of illness. A modified classification method from an article in the American Journal of Nursing (AJN) was favored. Classifications are defined: (a) mildly ill, (b) moderately ill, and (c) acutely ill. There were also classifications taken from the California Study. Status I, Status II, Status III, and Status IV are defined.

The investigator was assigned and carried out duties as other staff nurses on the unit. She started at 8 a.m. Interruptions were recorded on the checklist as they occurred while she was providing bedside nursing to her assigned patients. Recording was completed at 3 p.m. Patients were not aware of the study.

Completed checklists and patient data forms were turned over to statisticians for coding. Data were transferred to punchcards for each patient then sorted and counted electrically. Reports were available for each unit and progress reports made available for the research committee.

Final conferences with nursing unit staff were held to discuss their feelings about interruptions and to elicit their attitudes toward having a study done on their units.

Analysis of data.—Data are analyzed in relation to selected patient characteristics for the recorded interruptions that the investigator encountered while providing care for 102 patients.

Tables 1 and 2 show the rate of interruptions as directly related to degree of illness and dependency. Rate of interruptions increases as degree of illness and dependency increases. It was thought that this was affected by the fact that ill patients usually require more nursing care time.

Rate of interruptions by age of patients shown in table 3, length of hospital stay shown in table 4, and number of beds in rooms shown in table 5 were found to have no relationship.

Table 6 gives distributions of interruptions by rank order. This illustrates that 10 types of interruptions account for 50.3 percent of all interruptions recorded.

Tables 7, 8, 9, and 10 show rank order of interruptions by study units. The 10 interruptions occurring most frequently account for more than 50 percent of all interruptions.

Validity and reliability check.—The checklist was tested. Four registered nurses and two practical nurses participated as testers. Head nurses and unit staff were informed of the study and consented in the use of the checklist.

Nurse testers reviewed study aims, objectives, and the definitions of an interruption. With the help of the investigator, practices in recording interruptions occurred followed by practice with the use of the checklist. Practice in the classification of patients was also provided the testers.

Testers recorded interruptions encountered in the care of at least 25 assigned patients. Patients were assigned according to the number on the unit rather than the manner provided the investigator.

Patient data collected were name, age, admission date, date care was given, room size, degree of illness, and degree of dependency. Two conferences of the tester with the investigator were held each day to check collected data. Unlike in the study situation, collected interruptions were available for all nursing personnel to read.

Data collected by testers were turned over to statisticians, placed on punchcards for sorting, and compiled into tables similar to those in the original study. Comparison of the two sets was made. The checklist was considered valid and reliable, supported by statistical and other evidence. Reliability was based on the fact that the six nurses were able to identify from the checklist the interruptions they encountered.

Analysis of the data is shown in chapter VII. Interruptions occurring during the care of 154 patients for 1 day of care are analyzed. Rate of interruptions and dependency of patients is less than 5.7 percent per patient found by the investigator as compared to 2.0 percent per patient found by the testers. No relationship of length of hospitalization and rates of interruptions was evident. A slight increase was shown in interruptions on large wards. "Equipment not on the unit" and "obtain further information" are in the group of interruptions occurring most frequently. Four types of interruptions accounted for 4.7 percent of all interruptions recorded in the case of the testers. Ten types of interruptions contributed 50 percent of all interruptions recorded. Factors influencing interruptions are stated. Interruptions by patients not receiving care are most frequent and "patient-oriented nurses" receive more patient requests for care. Sicker patients require a greater quantity of and more complicated care. Routines for severely ill patients can be established in situations where patients are grouped together and interruptions would be less. In a situation where private duty nurses are present or in rooms with few beds, interruptions will be less.

A more intensive study of supply and equipment lack or failure is studied and reported in chapter VIII. Related literature is reviewed to further indicate the severity of the problem. Abdellah and Levine, *Effect of Nurse Staffing on Satisfactions with Nursing Care* (A2) and Herman Finer, *Administration and the Nursing Services* are quoted.

Method.—Preliminary observations on two nursing units reported by the nursing staff presented types of situations that occurred in regard to equipment and supply deficiencies:

- not on the unit when needed,
- on the unit but in use,
- inadequate for the purpose,
- broken,
- contaminated.

Other information collected:

- who reported the incident,
- time incident occurred,
- item of equipment or supply involved,
- how the incident occurred,
- was the item listed on an established par for the nursing unit,
- was the lack or failure under the control of nursing.

Purpose of the observation:

- to determine desirability of using nursing staff as observers,
- to obtain information about the nature and underlying causes for lacks or failures,
- to formulate a tentative checklist.

The research committee determined that nursing personnel could not be used as observers. They appeared to fear discrediting the unit, and information was incomplete.

From data, the committee determined four areas to identify underlying causes of deficiencies:

- nurses' planning,
- nurses' training,
- sufficient inspection,
- improper inventory.

A tentative checklist was formulated; information included:

- code number of the incident,
- type of situation,
- name of equipment or item of supply,
- description of the incident,
- was item on an established unit par,
- area of responsibility for lack or failure,
- underlying causes of the deficiency,
- date, unit, and hours of observations.

The investigator functioned as an observer-recorder. Personnel observed were selected on the basis of their assignments. Only morning assignments were observed for the length of time it took to complete the assignment. Recorded incidents were those falling into the described situations. Attempts were made to describe incidents as thoroughly as possible including the nature and underlying cause for the lack or failure.

A 36-bed general surgical unit was studied. The treatment nurses were observed for 40 hours, in the morning hours Monday through Friday. The information form was found workable and classifications of cases were acceptable to the research committee. Forty hours of observations were considered sufficient. Four additional units were a 38-bed medical unit, a 25-bed genito-urinary unit, a 38-bed surgical unit, and a 32-bed neoplastic ward.

Nursing staff was oriented to the objectives of the study. Observed personnel were asked to check the supplies and equipment needed for these activities. The investigator observed the staff members during patient activities. Assignments were recorded on the form. Failure of equipment and supplies was recorded. Nature of underlying causes was investigated and recorded. The information sheet was shown to the staff following the observation period. This was discontinued to reduce bias in the study. Information sheets were given to the statistician for coding and sorting.

Analysis of data.—In all, 325 incidents collected in 200 hours of observation were analyzed. Data are shown in tables. Specific lacks or failure are classified in table 17. Most incidents occurred because equipment or supplies were not on the unit.

Table 18 shows more items were established par items than were not.

Table 19 shows frequency and percent of incident by type of items. Most frequent lacks and deficiencies were found in treatment, equipment, and supplies.

Table 20 shows frequency and percent of incidents by area of responsibility. The majority of lacks or failures were found within the nursing unit.

Frequency and percent of incidents by activity failure shown in table 21. One hundred fifty, 46.2 percent occurred because of a lack of planning; 97 of these were within the responsibility of the nursing unit.

Table 22, classifications by types of nursing units, shows that surgical units contributed more incidents of equipment lacks or failures.

Distributions of types of items for each study unit are shown on table 23. Linen problems occurred most frequently on both medical and surgical units.

Table 24 provides distribution of incidents by nursing unit and areas of responsibility.

Table 25 shows distribution of incidents by activity failure and nursing unit.

Table 26 provides distribution of incident types by activity failure.

Other factors contributing to lack of supplies and equipment were:

- variations in the amount and types of supplies used by individual nurses, (1) linen, and (2) treatment equipment and supplies,
- types of patient being treated showed variations in required supplies and equipment.

Assigning incidents to a particular area of responsibility proved difficult because complete information was not available. Incidents were often complex; lacks often involved several departments and various methods of obtaining a wide variety of supplies.

Conclusions and recommmendations.—It was felt that the nurse should have obtained more information about the patient and supplies needed before starting her activities.

Further study is recommended in the area of what and how information should be given to nursing personnel assigned to direct care.

The nurse is considered a major factor in the problem: her work habits and plans and her conception of work assignments.

Interruptions by patients mean that their needs are not being met by nursing personnel assigned to them. This may be because of "task-oriented" personnel, shortage of nurses, and other problems that should be handled through educational programs.

It is pointed out that equipment and supplies come from many different sources that can be affected by shortage, poor planning, and lack of coordination. More emphasis should be placed on nursing management.

Interruptions and lack of equipment and supplies are often dangerous to the patient and frustrating to the nurse.

Critique

Nursing care interruptions are known to be numerous and are of concern to nursing administrators as well as to the nurses providing the care. Such interruptions are costly in terms of nursing personnel utilization and personnel morale. Considerable concern has been expressed in regard to the effects of interruptions on patient welfare. A number of investigative efforts have been directed in this general area for if the numbers of interruptions are to be reduced they must be identified and their cause determined.

Smith's investigation involves the identification and measurement of the interruptions encountered by nursing personnel who were actively engaged in carrying out patient care assignments in hospitals.

The theoretical framework of the study is developed; the rationale for the study is sound. Terms are defined for the purpose of the study and a brief literature review is included.

The survey methodology is employed. Data were collected by participant observers and observer recorders. An adequate pilot study was conducted in development of the procedures employed. The checklist used in the collection of data was adequate.

Interruptions were assessed in relation to: • the degree of patient illness, (categories of degree of patient illness for classification were adopted from an article in the AJN): mildly ill, moderately ill, and acutely ill; these categories are defined in general terms: • degree of physical dependence, categories Status I, II, and III are adopted from the University of California study; • patient's age; • patient's sex; • length of hospitalization; • number of beds in the patient's room; and • reason for the interruptions.

This is not a large sophisticated study but is one that could be adopted for use in most hospital situations, and the cost would be moderate. The use of more discriminating categories for the classification of patients in relation to illness and dependency would be desirable. The study is well written. Samples of instruments are included and findings are presented in table form. This study does not contribute to nurse staffing research design but presents an acceptable method for the investigation of a problem common to most hospitals. It does point out the value of a well developed supply and retrieval system. It also supports the need for nurses to be well trained in the logical use of supplies and materials. The work habits of the nurse are highly related to the effectiveness of the use of her time.

A62. Spitler, Janet Lee. "A Survey of Attitudes of Selected Staff Nurses Toward Selected Aspects of Their Jobs." Unpublished Master's Thesis, University of Washington, Seattle, Washington, 1964.

Review

Purpose.—To survey the attitudes of staff nurses toward selected aspects of their jobs and to identify areas with which they indicated dissatisfaction.

Method.—All full-time staff nurses engaged in "general duty nursing" in a 320-bed general hospital located in a metropolitan area comprised the sample.

A survey instrument (formerly called the SRA Employee Inventory) was constructed by Science Research Associate, Inc., and was used in this study. The instrument contains 78 items, grouped according to (a) the job and conditions of work, (b) financial rewards, (c) personal relations in the company, (d) operating efficiency, and (e) individual satisfactions.

Instructions were given to each participant by the investigator prior to the survey. Some of the terms used in the instrument were interpreted to the respondents. "Boss" was interpreted as meaning head nurse, "management" as meaning nursing service administration, and "company" as meaning the hospital.

Respondents were asked to give the length of their employment. Respondents indicated their opinions by marking "agree," "undecided," or "disagree."

From a population of 113 full-time nurses plus one part-time nurse, 108 or 94.7 percent returned the instrument.

The survey form was scored according to the instructions of the survey authors. The Profile Scale or the report of the results of the SRA Employee Inventory was the scaling device used. General morale level was determined by inspection of the group profile. The strong and weak points were determined by comparing the category scores with the "company average."

Findings.—Of the 14 categories, four reflected strong points of this group and seven reflected weak points. Strong points included pay, adequacy of comunication, status and recognition, and opportunities for growth and advancement. However, subquestions did not agree with the degree of overall satisfaction. Although the score for pay, as a category, was high, only 53 percent felt that their pay compared high with other hospitals; 52 percent felt that pay matters were handled adequately and 60 percent thought their pay was enough to live on comfortably. Each of the other categories reveals similar inconsistencies.

The areas of dissatisfaction for the group included job demands, employer benefits, supervisor-employee interpersonal relations, technical competence of supervision, effectiveness of administration, security of job and work relations, and identification with the hospital.

Three categories that were not listed as areas of satisfaction or dissatisfaction were working conditions, friendliness and cooperation of fellow employees, and confidence in management.

A total of 140 comments were made in the space provided in the survey booklets. Of these, 113 were unfavorable.

Forty-one percent of the nurses were employed 6 months or less, and 23 percent employed between 1 and 2 years. Since only 68 percent had been employed more than 2 years, a high turnover rate was substantiated.

Critique

The relationship between satisfaction of the employee and the level of staffing has not been fully explored. It is reasonable to expect a relationship. This study does not explore the question, but it does look into conditions of work.

The sample used in the survey was adequate. The instrument applied in the thesis had been constructed for industry and had not been modified for use in a hospital. Only limited information is given about the tools.

Two findings were of importance to the staffing question and both were in areas of dissatisfaction, job demands, and working conditions. However, the conduct of the study was such that a high degree of confidence cannot be placed in the results.

A63. Straub, Kathleen Mary. "A Study of Changes in Job Satisfaction of Nurse Practitioners Following an Inservice Education Program." Unpublished Doctoral Dissertation, Columbia University, New York, 1964.

Review

Purpose.—The primary purpose of this demonstration project is "to determine if there would be a significant increase in job satisfaction scores following a cooperatively developed inservice education program." Two secondary purposes are included: one directed toward development of a methodology relative to inservice programs and the other toward securing data useful to institutions of nursing education.

Method.—The study was conducted in a large metropolitan hospital. Thirty-five nurse practitioners in medical and surgical nursing units comprised the sample. They cooperated in the development and conduct of an inservice education program 14 weeks in length, one meeting per week. The attendance of the 31 at meetings ranged from 54 percent to 89 percent. The questionnaire schedule developed by Robert P. Bullock, "What do Nurses Think of Their Profession?" was administered preceding and following the inservice program.

Five hypotheses were tested in relation to an increase in the terminal test scores. The prediction was that an increase in scores would occur in all five parts of the questionnaire: job satisfaction; appraisal of nurses and nursing; rewards of occupation; work adjustment; and appraisal of leadership. Only the first was supported by the data.

The author, aware of the validity of the instrument, examined the data for construct validity and found that only two of the four objective items in the instrument seemed applicable for construct validation. She found that the reliability of the instrument was slightly lower than that reported by Bullock.

Conclusion.—She concluded that the cooperatively developed inservice education program did result in an increase in the test scores. However, she points out that, since the study was an uncontrolled study, the evidence is not conclusive and no prediction can be made as to the effect of a cooperatively developed inservice program on job satisfaction.

Critique

Relatively little is known about the effects of inservice education on performance in nursing and job satisfaction in nursing. Much testimony has been written about experiences with approaches and content, but only limited testing of these have been conducted. The question, therefore, is an apt and highly relevant one, especially since factors of cost continue to emerge.

The methodology used presents limitations. First of all, the author had no intention of conducting a strictly experimental study with controls. Participation of the nurses was voluntary. Attendance fluctuated considerably. The validity of the instrument was recognized as limited but used since no known valid criterion measures exist. The report gives a detailed description of each facet of the report. The statistical treatment of the data is extensive.

The analysis is reported in detail, and the various tests appropriately made. The author included a number of implications about the results but failed to recognize the theory from psychology dealing with learning, other than a short reference to it in the text of the report. Specific objectives were established *for each* individual topic, but *no long range behavioral objectives* were established for the group at its initial meeting or planning meetings. The author made no reference in her discussion to the fact that total inservice program may have been perceived by the individuals as a series of unconnected experiences having no focus on change in behavior.

The report, though thorough in its treatment of certain items, such as Bullock's questionnaire and the description of the inservice education program provided by the group, lacks a theoretical basis for the experimental variable. Only a brief discussion is given of the vast literature in social psychology on attitude changes in groups. No reference is made to learning theory or the relation of knowledge and its translation to nursing practice.

The demonstration, though limited in respect to its knowledge base and in the control of extraneous variables, makes a contribution in describing how the program was conducted. It assists in the examination of the Bullock questionnaire. However, because of the small sample size and the setting, as well as the lack of experimental control, it does not answer the question of the effect of inservice training upon job satisfaction. It has only limited application to the staffing question.

A64. Sturdavant, Madelyne. "Comparisons of Intensive Nursing Service in a Circular and a Rectangular Unit." *Hospital Monograph Series No. 8,* American Hospital Association, 840 North Lake Shore Drive, Chicago, Illinois, 1960.

Review

Purpose.—The purpose of this research "was to learn the effects of the two experimental variables (different travel distances between nurses' station and patients' rooms, and the presence or absence of visual contact) on the utilization of nursing time and on the satisfaction of participants in stage-1 service while the service operated successively, in different study situations, under conditions which were as nearly equivalent as possible except for the two experimental variables."

Hypotheses.—(a) that the time of the nursing staff could be used more effectively in a circular unit than in a rectangular unit,

(b) that the overall satisfaction of patients, their relatives, their physicians and members of the nursing staff would be greater in circular units than in rectangular units.

The terms "stage-1," "stage-2," and "stage-3" refer to the intensive, intermediate, and minimal stages of nursing need. Stage-1 care is separated into stage-1A and stage-1B referring to greater and lesser needs, respectively.

Method.—Two control units were provided as a basis of comparison for the circular unit. One control unit was the circular unit without visual contact, which was eliminated by painting the glass panels in the doors of patients' rooms. The other control unit was a rectangular unit.

The similarities of the rectangular unit and circular unit include • recently decorated, • waiting room, • number of private rooms, • type of beds, • location of charts, • signal system, • location of nurses' station, • number of unit-locations, • same type of equipment and supplies except for oxygen and suction, and • auditory contact.

Differences between units include • presence of air conditioning, • noise, • size of rooms, and • certain travel disadvantages such as location of refrigerated drugs, location of soiled linen hamper, and the presence of oxygen and suctioning equipment.

The conditions under which the service operated in the different study situations were closely matched. The staffing pattern remained the same throughout the period of the studies. On the basis of dividing the average number of working hours of the staff by the average patient census per day, there were 10 available hours of nursing time per patient. Fifteen of the 18 people on the nursing staff worked in each study situation. Two staff nurses and one nurse aide worked either in the circular unit or in the rectangular unit but not both. Ten surgeons had patients in the stage-1 service and each had approximately the same proportion of the total patients in each study situation. Patients who had undergone one of the preselected 15 operations comprise about 90 percent of those admitted to the different study situations. The proportion of patients remaining 4 days or fewer was from 81 to 86 percent in the different study situations. Patients with conditions that would interfere with interviewing were not included. The charge for stage-1 service was $30 per day on both units. In order to control admission procedure, a certain process was followed. The actual admission to the stage-1 service was from postanesthesia service or directly from the operating room. The central source of information was from the admitting officers, who were asked to avoid evaluative statements and to say nothing about the service in one study situation that could not be said in the other.

The stage-1A and stage-1B, indicating greater or lesser nursing needs, were based on the head nurse's judgment regarding the severity of the 15 operations. The two groupings of these operations are included.

The format for interviews and the use of observers were pretested. Two months were required to gain enough patient interviews for statistical testing. Two weeks were necessary to isolate the effects of travel distance from the effects of visual contact on the amount of time required in travel in the circular unit.

The work sampling method was employed to measure the use of available nursing time. The method was pretested during 24 day and 24 relief shifts. The total samples of all study situations (69 day shifts and 67 relief shifts) were reduced by eliminating all shifts during which the census was lower than 10 patients and those shifts which proved by statistical testing to be atypical of the remaining sample. The resulting final samples were 42 day shifts and 43 relief shifts.

The primary purpose of recording patients' calls was to learn whether calls were answered with equal promptness in the circular unit, rectangular unit, and the circular unit with visual contact. Data were recorded by an electrical device called an "operation recorder." A supplemental recording was summarized to present the difference in results when members of the nursing staff in the circular unit did not know they were being observed.

The primary purpose of studying trips into patients' rooms was to learn whether the visual contact had any effect on the time spent in travel. Trips into patients' rooms were recorded on the day shift only and included trips of the head nurse, the three staff nurses, and the nurse aide. Three clerical observers were trained during the period of pretesting.

The purpose in studying all corridor trips was to learn of any significant differences in travel requirements. One observer per person observed was required in the rectangular unit. One observer could record for three persons in the circular unit. Corridor trips were recorded on three day shifts and three relief shifts. Comparison assumes that whatever the effect of travel consciousness, it was the same in both study situations.

To learn the approximate distances involved in corridor travel, the distances traveled on the days when all corridor trips were recorded was measured. A mileage meter was converted from scaled to actual distance. The mileage meter was checked throughout the study to assure accuracy.

To study the effect of visual contact in the circular unit, it was necessary to know how much time one or more members of the nursing staff were in the central area and how much visual contact was eliminated by pulling drapes. The length of time the doors were left open far enough to maintain visual contact was recorded. The data were recorded at 15-minute intervals. The recorder also was the recorder of trips into patients' rooms and was conditioned in work sampling.

To learn whether patients received equivalent amounts of care in different study situations, the work sampling technique was employed. All activities directed toward the care of the individual patient was called "direct care." Direct care included actual nursing care in the presence of, or away from, patients. The category "with patients" was one of the categories of a patient content basis of classification. The other category of this classification, "within view of patients," was peculiar to the circular unit where visual contact existed. Activities of the nurse were also classified according to functions or purposes. These included corridor travel in the nursing unit, direct care, indirect care, standby, general activities, delay and personal, and others. The observation of each individual staff member was recorded directly on the punchcard used in examining data. The information included who (person of which skill level) was doing what, where, and when. At 15-minute intervals, an observer made rounds to record the activity in which each staff member was engaged. The sequence of rounds was randomly chosen and was pretested by 18 different nurses. Three nurse aides were selected as regular observers. They were trained during the pretesting period. They received one orientation session and one week of rounds by the observers with the nurse coordinator. Emphasis was placed on adhering to the use of the round-of-location cards and stating the activities explicitly. The patient-contact classification was made by the observer; the functional classification was made by the nurse coordinator. A total of 45 nursing hours on the day shift (six full-time persons) and 30 hours (nine full-time persons) on the relief shift were observed in the work sampling process.

The purpose of studying patients' reactions to their stage-1 service was to test whether there was greater overall satisfaction of patients in the circular unit as a result of the visual contact. The same questions in the same sequence were asked in personal interviews with patients in the rectangular unit. The specific questions evolved from 32 interviews with patients in the stage-1 service to learn what topics were of greatest interests to them and how they expressed their reactions to the service.

In constructing the questionnaire used in the interviews, it was assumed that patients could not reflect their overall satisfaction or their lack of it in response to questions about particular aspects of their care. General questions used in the interviews are presented. The questionnaire developed from this preliminary interviewing was pretested in 20 interviews each in the circular unit and in the rectangular unit. The regular interviewer conducted 87 percent of the interviews in the rectangular unit and 36 percent in the circular unit. The interview results obtained by two different interviewers were compared and showed no statistically significant differences. There were 336 patients admitted to the two units during this study and interviews were not conducted with 33 rectangular unit patients or with 34 circular unit patients for various presented reasons. To compare the distribution of responses, "the chi-square test of significance between the distribution expected under the hypothesis of independence and the distribution actually observed" was used.

The purpose of studying relatives' reactions was to determine if the overall satisfaction of circular unit relatives would be greater than that of rectangular unit relatives. A close friend was accepted as a "relative" if no relative was visiting with the patient. The overall satisfaction was considered to be expressed by responses to (a) comparison of stage-1 service with general nursing service, (b) degree of security the relative felt with the stage-1 service, (c) comparison of relatives' security with respect to the stage-1 service and private duty nursing, (d) effect of the unit on the morale of patients, and (e) comparison of charge for the stage-1 service. The questionnaire and stamped envelope were left with each patient or relative. The questions were formulated using informal group interviews and several personal interviews with relatives. Of the 89 relatives of patients in the rectangular unit, 86 returned the questionnaire. Of the 116 relatives of patients in the circular unit, 108 returned the questionnaire. About 20 relatives from each unit received one followup letter, of which half received a second followup letter.

The purpose of studying supervision of the stage-1 service was to learn in what ways supervision differed in the rectangular and circular units. Persons with supervisory experience in both units participated in conferences after the collection of data. A list of operating activities was available for discussion. Minutes of each meeting were sent to participants.

Findings.—Measurements of patient care were based on how much care was given, what proportion of care was given by professional nurses, how many trips were made to patients' rooms, what proportion of trips were on the initiative of nursing staff, how many calls were made by patients, and how promptly patients' calls were answered. The comparison of these factors in the rectangular unit and the circular unit showed that very slight differences favored the rectangular unit.

The only notable difference between the care in the two study situations was that visual contact was available in the circular unit. At least one staff member was situated in the central area from which patients are visible for more than 50 minutes per hour during the day and relief shifts. Staff nurses of both units were in patients' rooms about half of their working time, but in the circular unit, the staff nurses were in the central area where they could observe patients an additional 40 percent of their working time. The drapes were pulled 15 minutes during the day shift and 6 minutes during the relief shift in addition to the time when drapes were pulled while the nurse was in the room.

The overall satisfaction of patients was based on 119 patients who received their stage-1 service in a rectangular unit in the spring and 128 patients who received their stage-1 service in the circular unit in the summer. Patients who occupied the stage-1 service in the circular unit and the rectangular unit were pleased with their service. The degree of satisfaction was significantly greater among patients of the circular unit. The difference was accounted for by the presence of visual contact in the circular unit. Both the circular unit and the rectangular unit patients were pleased with their care and there were no statistically significant differences in their responses about the care with respect to promptness, frequency, instances of rush, delay or careless handling, competence, and attitude of those who rendered the care. There were no significant differences in the patients' responses to the rooms in general, amount of light, or degree of privacy. There were statistically significant differences in the degree of satisfaction with the air conditioning and bothersome noises. No question could be asked about visual contact because it is important that the same questions in the same sequence be asked of patients in both units. Yet 128 circular unit patients made about 250 comments referring to the visual contact.

The tests and levels of significance applied to responses of 86 relatives of interviewed rectangular unit patients and 108 relatives of interviewed circular unit patients showed that the overall satisfaction of relatives of the circular unit patients was greater than that of the rectangular patients with one exception—that of general nursing service. The circular unit patients' relatives rated the following measures as higher: the assurance that "every need" was met when the relative was away from the hospital, the degree of confidence in the stage-1 service in comparison with private duty nursing, effect on the patients' morale, and comparison of the charge for the stage-1 service with other rooms and private duty.

Ten surgeons were asked in a brief questionnaire to compare the rectangular unit and the circular unit with respect to the patients, the surgeon's conveniences, the nursing care, and their personal preferences. Eight of the 10 surgeons preferred the circular unit to the rectangular unit because the visual contact affects patient care and satisfaction of patients, the central location of the nurses' station, and the concentration of working materials in that location. Two surgeons felt that only an occasional patient would need the advantages of the circular unit. All of the staff nurses preferred the circular unit.

Regarding the utilization of nursing time, the amount of time spent in corridor travel was analyzed and the total available time spent in activities was measured. Travel time was saved in the circular unit as a result of the shorter travel distance and fewer trips into patients' rooms for purposes of observation. The time saved in the circular unit was not used in more total patient care in the circular unit than in the rectangular unit because the nurses had all the time required for care in the rectangular unit and the design of the research was intended to produce equal amounts of available nursing time. The same amount of direct patient care was received by patients in the circular unit but the time was used more effectively because observation of patients outside their rooms was continuous. Relatively more time in the rectangular unit was spent in precautionary observation whereas in the circular unit more time was spent in attending to specific needs, less time was required of the head nurse in rounds in the circular unit to learn of patients' condition. The potential value identified was the possible effect of visual contact on the improvement of the skills of young nurses through their observation of the work by more experienced nurses.

Results.—The hypotheses were confirmed: the circular unit, compared with the rectangular unit, was more effective with respect to satisfaction of patients, their relatives, physicians, and nurses, and with respect to the utilization of nursing time. These results were interpreted to be primarily the effects of the experimental variables—shorter travel distances and visual contact in the circular units.

Critique

In planning staffing requirements for groups of patients, questions of the configuration of the nursing unit are often raised. The effect of the distance between patient rooms, rooms servicing the patient rooms, and patient rooms and the nursing station is not known. Neither has the effect of increased visibility between patients and the nurses been identified. The assumption has been made frequently that the circular unit provides a unit that lends itself to better utilization of nursing staff than does the rectangular unit, and that the increased visibility provided by the circular unit increases satisfaction of all concerned and reduces nursing time in travel. The study by Sturdavant, et al., attempts to test these assumptions.

A great deal of time, money, and preplanning went into this highly detailed study, which has become one of the classics in the field of architectural design of nursing units. It is unfortunate that the study provides little theoretical framework upon which the significance of the study is built and from which the hypotheses are derived. The literature from psychology, especially from social psychology, has not been tapped for its rich studies on small group behavior, or on human behavior in disasters, or on anxiety. Likewise little background has been drawn from the field of engineering on the study of work.

The research study itself is meticulously reported.

Great detail is provided the reader so that he can examine the features of the two units that were alike and those that were not. Variables are operationally defined. Instruments were carefully built, pretested, and rebuilt. Observers were trained and pretested. Sample sizes are adequate. The data are treated statistically in appropriate fashion.

The results confirmed the hypotheses that the circular unit was more effective with respect to both satisfaction of patients and utilization of nursing time. One important feature of the study, however, can be readily overlooked. The nursing time saved in the circular unit was not used in more total patient care. The design was made to produce equal amounts of time for nursing categories. More time of nurses in the rectangular units was used in observation that required travel. The interpretation was made that the advantage of the circular unit was due to the fact that the design increases visual contact. Can the same degree of satisfaction be secured through other means of monitoring?

This study does not enable one to say that fewer nursing hours are required in the circular units than in the rectangular units. It does point out that the hours were better utilized. It is the use of the phrase, "better utilized," that requires interpretation. What we also learn is that with a rectangular unit or with a circular unit, time for observation is required.

A65. Trites, David K.; Galbraith, Frank D.; Sturdavant, Madelyne; and Leckwart, John F. Final Report on Research Project Entitled: "Influence of Nursing Unit Design on the Activities and Subjective Feelings of Nursing Personnel." Research Office, Rochester Methodist Hospital, Rochester, Minnesota, (no date).

Review

Purpose.—The purpose of the study was to investigate "the impact of radial, double corridor, and single corridor nursing unit designs, with minor architectural and systems modifications, on the activities and subjective feelings of nursing personnel working on four units of each design." The differences were minor, such as placement of toilets within patient rooms, presence or absence of windows in two places, and presence and absence of nurse-patient verbal intercommunication system.

Methodology.—The methodology is explained in detail. Statistical methods are used to compensate for lack of experimental controls. (The 12 nursing units were operated intact without any movement of staff or type of patient.) Multiple linear regression analyses "were used to achieve statistical control of irrelevant variables," similar to that described by Abdellah and Levine. The authors describe the method as follows:

- computation of one or two regression equations for each dependent variable to determine if more than one independent variable contributes to the prediction of the dependent variable;
- the "f" test to determine significance of the independent variables upon the dependent variables;
- the "t" test of the significance of each coefficient of the variables in the equation;
- the regression analyses were computed using a stepwise regression program, adding variables to the equation sequentially in order of the contribution made by the variables in reducing error variance. The program terminated when the last variable added was detected to have made a contribution which was not significant at, or less than, the .01 level;
- as a final test of the impact of design, the means of the subset of dependent variables reflecting proportions of activities and locations where they occurred were adjusted by a regression equation. The adjusted means were ranked according to a dimension of desirability when such a dimension could be ascribed to a given proportion. These ranks were analyzed by one way analysis of variance; or
- chi-square analysis was used on a few occasions when appropriate.

Variables.—Three sets of variables were identified: • six design variables; • 41 control variables representing characteristics of the patients, of the hospital or nursing units, or of the nursing staff; and • two major dependent variables; work activities and subjective feelings.

A major control variable was called the Patient Control Index. The measure represented the nursing needs of the patient on each nursing unit. The Patient Control Index was developed in conjunction with all the registered nurses and licensed practical nurses from all units in the hospital. They were asked to think of the nursing requirements of the above *average* patient of each of 27 medical and surgical specialties in the hospital, identifying which five would require the most care. The same procedure was then followed for the average and below average patients. These nominations were compiled for each of the 27 clinical types of patients on level of need and found to cluster into six groupings within each category of need. Three weights were assigned to patients within each clinical service based upon the agreements among the nurses of various shifts and the clusters. Weights from one through six were given for below average nursing needs, two through 12 for average needs, and three through 30 for below average needs. No defense of validity was presented other than the logical relationship with other variables, but the authors described the estimation of its reliability, which was given as varying from 186 to .629. The head nurse or the nurse at the end of each shift provided the data about each patient.

Other control variables were obtained by the use of special forms completed at the end of each shift, or from hospital records, or by special observation.

The dependent variables were collected by work sampling observations and by use of a questionnaire given to staff before each shift and after each shift. The techniques described by the USPHS were used, with an extension that consisted of putting data on punch cards. Data were collected by 12 observers, during June 19, 1967, through September 6, 1967. A total of 77,399 observations were made.

The questionnaire was constructed from work previously done by other researchers. There were 14 dependent variables purporting to measure subjective feelings, such as tenseness, anxiety, psychosomatic disturbances, fatigue, and perceptions of work efficiency and workload. These were also set in form for computer use. The return on the questionnaire ranged between 90 and 95 percent each day.

The nursing sample consisted of a total of 590 different staff members over a period of 82 days. The nursing units were 12, four of each design.

Data preparation. To create a large base for computation of proportions work sampling activities, data for each nursing unit were pooled for three consecutive days and for each block of observations used. Observations of any staff member who did not work three consecutive days or who was observed less than 10 times in a shift were eliminated; likewise, the preshift and postshift questionnaire scores were transformed on the basis of 3 day time block.

Additional interstudy studies. A nurse-patient intercommunication study was introduced in July in all linear units and one radial unit (Thursday through Sunday). Observations were collected about the number of trips initiated by nursing staff or initiated by patient's call light. In August the intercommunication system was activated on all units and similar observations were made.

A short questionnaire was administered to the nursing staff about preference for the three basic designs. A total of 403 staff members completed the questionnaire.

A natural experiment occurred with the interchange of patients and staff on two services, one on a radial corridor, the other a double corridor. Reactions were obtained from the nursing staff, patients, and physicians.

Results.—Correlations between the 16 dependent variables, based upon work sampling and three unit designs, the Patient Control Index and Patient Census, were set up in tabular form with multiple correlations derived for each variable. The means of the 16 sampling variables, unadjusted and adjusted for regression, were given in a second table and were expressed as percentages of activities and locations. Ranks were assigned to each of the means of the activities (for which a direction was desirable—high versus low) for each of the three shifts. The resulting fact was that the single corridor design was the least desirable, but no clearcut difference existed between radial and double corridor. Analysis of variance of the ranks indicated a statistically significant difference at the .05 level. The majority of first place rankings for radial units were on location variables. For the double corridor units, these were on activity variables.

The rank analysis was made considering each shift as independent replication of the study. Selecting variables for which direction was predicted and which had at least one significant regression coefficient for a shift and which were significant on two or more shifts, a second analysis of variance was computed. This analysis was significant at the .01 level. The radial was superior to the single corridor design 85 percent of the time; to the double corridor, 60 percent of the time; and the double corridor to the single, 65 percent of the time.

The results of the regression analysis for the variables, impact of toilet rooms and vision panel, were completely ambiguous. Two surveys of room vision panels indicated that they were open on all three shifts.

The 14 subjective variables were analyzed in the same manner as the work sampling variables and the results were inconclusive.

Chi-square analysis demonstrated a significant difference at the .05 level in absences among staffs on the three types of units. These differences are greater, at the .01 level, when single and double units are pooled. Relatively fewer absences occur on radial units, the next fewest on double corridor units and the most on single corridor units.

For accidents to staff members, a significant difference exists at the .10 level and the .05 level when data about staff from radial and double corridor are pooled. Relatively more accidents occur to staff members on single corridor units than occur to those on radial or double corridor units.

An overwhelmingly larger percentage of nurses, licensed practical nurses, aides, and ward clerks prefer radial units.

Data regarding the effect of the intercommunication system indicate little or no effect on its activation; however, in reply to the questionnaire about it, a large percent (over 72 percent of 279) thought it important and liked it.

Conclusions.—The authors present six conclusions:

- the radial design was superior to the other two designs and the double corridor superior to the single corridor;
- nursing personnel on radial units travelled significantly less, and the double corridor was next;
- the time saved in travel was spent in more time with patients;
- the great majority of nursing staff members preferred to work on radial units and believed the design enhanced patient care;
- from a minor study, physicians felt the design enhanced the quality of care;
- the nurse-patient intercommunication system did not reduce the number of trips made by nursing personnel, but the nursing staff on linear units felt that it did and indicated the value of the system. The nursing staff on the radial units did not use the system.

Critique

The problem is highly pertinent and one to which little study has been directed. It is concerned with staffing—does the type of design influence the amount of staff required and does it affect how the staff feels about the work environment?

The methodology is primarily statistical. It is explained in detail but it is not presented or summarized totally in the text, and reading is difficult without cross reference to the explanatory material about methodology. However, it appears that a precise method was used and protocol was followed.

No report of validity or reliability was given for the questionnaire on subjective feelings. Neither was it pretested on a sample. The agreement between observers was not reported either for the post training or for the data collection period. It is not known how the nursing staffs compared during this period, although from reading the report one assumes that data on this variable were collected, but the report does not give the number of nursing care hours per patient by nursing unit. Only one reference to the discussion implies that this was held constant. (p. 57.)

The analysis was carried out carefully. It appears that the interpretation was based upon the findings. The report, however, fails to report some important facts or perhaps these were overlooked.

The reference to the literature review is very sketchy. There is no reference to the knowledge base drawn from industrial psychology pertaining to the effect of the environment upon the worker or studies in the field of time and motion. The work sampling studies in nursing are not reviewed. Some work of this kind (architectural variables) has been done but none of these is included.

The limitations of the study (the lack of validity and reliability about the questionnaire on subjective feelings and the inconclusive data derived from it) are unfortunate. There needs to be a study done of the individual's reaction to his work setting.

The study does contribute to our knowledge about the relationship of design to nursing activity as it is carried out in this setting. However, we know nothing about the nursing staff—their qualifications, their composition, the number of hours, etc. We can assume from the study that these were comparable between units. The setting is a large medical center and generalizations can be made only to other comparable situations. The problem of studying the effect of design is exceedingly complicated. This study, therefore, provides us with middle knowledge that is useful.

A66. Upham, Ronald Taylor. "An Evaluation of Nursing Time and Labor Costs Resulting from the Implementation of a Unit Dose Hospital Drug Distribution System." Unpublished Master's Thesis, University of Iowa, Iowa City, Iowa, 1969.

Review

Purpose.—"The primary objective of this study was a determination of the amount of nursing time that may be released from medication activities through a conversion from traditional hospital drug distribution to a unit dose hospital pharmacy service."

Hypotheses.—"I. The amount of time involvement of nursing personnel with *inventory control and ordering* activities is the same for the traditional system and the unit dose system."

II. The amount of time involvement of nursing personnel with *kardex preparation* activities is the same for the traditional system and the unit dose system."

"III. The amount of time involvement of nursing personnel with *preparation of medication* activities is the same for the traditional system and the unit dose system."

"IV. The amount of time involvement of nursing personnel with *administration of medications* activities is the same for the traditional system and the unit dose system."

"V. The amount of time involvement of registered nurses with *charting fulfillment* activities is the same for the traditional system and the unit dose system."

"VI. The total amount of time involvement of nursing personnel with *medication related* activities is the same for the traditional system and the unit dose system."

"VII. The precision (or absence of variable error) of *fulfillment charting* is the same for the unit dose system and the traditional system."

Sample.—The unit selected for study was an internal medicine ward, 3 West, of the University of Iowa Hospitals and Clinics. General nursing procedures, scheduling of staff, and the physical layout of the study site were comparable during the two observation periods.

During a 2-week observation period, the appropriate sample size was determined, based on estimates necessary to provide a confidence level of 95 percent and a confidence interval of 0.02. A 28-day observation period was recommended to include all the activities to be observed in this study. Observations were suspended during the holidays and University examination periods. The schedule allowed more than a month between unit dose system and the traditional system. Observations of all nursing personnel were taken 24 hours per day.

All nursing personnel on duty were included in the study measurements. Nursing students were excluded. With the cooperation of nursing service, a constant level of staffing was attempted throughout the study period.

All nursing activities that may be influenced by the type of drug distribution system were identified and defined. The activities measured under both systems were: inventory control and ordering, kardex preparation, preparation of medications, administration of medications, and charting fulfillment.

Instruments.—Comparisons were made between the time requirements of the two methods of drug distribution. Variations in work rate were estimated by measuring the daily workload of the nursing staff in terms of doses administered. The precision of charting and resulting changes in drug revenue were evaluated from daily measures of workload. In addition to time study observations, measurements include: patient census (number of "critical" and "other" patients), number of new medication orders written, number of orders transcribed, number of doses charted, number of doses administered, and number of antibiotic doses prepared and administered.

Procedure.—Nursing time involvement was determined while the unit dose system was in operation. (November 22, 1968, to December 20, 1968). Identical measurements were taken after the traditional system had been established on the same area. (February 2, 1969, to March 2, 1969).

Data were collected in concurrent but separate procedures by observer technicians and counter technicians. "All of those selected for orientation and training had some college background and demonstrated the personal qualities necessary for employment on a patient care area." Pharmacy students were primarily recruited for counter technicians since this position required some knowledge of drug identities and the medication cycle. Twelve hours of orientation and training were given each technician. A 53-page Observer's Manual, which was distributed to each individual, included an explanation of the procedure for observing and counting, the daily routine of nursing duties, the definition and description of each nursing activity, and the personnel policies and rules of conduct that were maintained. An oral review of the manual was given. Each technician was taken to the study site for further orientation and practice of measurement with study staff. Periodic checks were made to insure agreement among technicians and study staff and to provide an educational device for correction of misunderstandings. Training was continued until 100 percent agreement was achieved.

Observers and counters wore white lab jackets and identification pins. Three observers and one counter were assigned to the day shift, two observers and one counter were assigned to the evening shift, and one person performed both the observer and the counter duties during the night shift. Each observer recorded the activities of two or three nursing personnel. There was 1 hour of overlap between shifts to assure complete data collection. A team leader was responsible for general observation and team procedure.

Nursing staff were required to wear number tags that specified their professional category. The nursing staff were assured that speed and efficiency were not being investigated. The technicians were trained on the unit for 2 weeks prior to the actual study. Each member of the nursing staff was observed once every 10 minutes. The observation recording form was produced by a computer program that randomized the order of observation. The observer's task was to identify the nursing activity performed at the exact time, matching the activity with the appropriate two-digit code number and recording the number beside the observation time. The observers were required to note the activities of the person being observed for 1 minute before and following the actual observation time. Activities that could not be identified with complete confidence were evaluated by the team leader for the observers and counters.

When a member of the nursing staff left the study site, she would take a small electronic paging device and a small recording form. She was asked to identify whether she was picking up medication at the pharmacy or was involved in other activities on the recording form, if contacted by the observer. The counter quantified the total number of doses administered by nursing personnel. Each dose was recorded in the proper dosage form category. The 11 p.m. to 7 a.m. counter reviewed the patients' charts to determine the number of doses charted, the number of orders written, and the number of orders transcribed during the previous 24 hours.

Findings.—Time study data of nursing medication activities, as measured under both the unit dose and traditional systems, are summarized. the number of medication doses administered was considered to be the most sensitive indicator of nursing time involvement. The amount of nursing time spent on each of the medication activities varies with the number of doses administered. Time differentials were calculated in minutes per dose for all activities. The use of a single workload variable offers a consistent and meaningful basis of comparison of the two systems by individual nursing activity. The differentials in minutes per dose administered for all activities combined can be used to project the overall difference in nursing time between the distributive systems for each type of patient care area.

Differentials in nursing labor cost per patient care area were determined. The average workload level in doses administered is derived. Average doses per month are calculated according to 8-week study periods. The product of average minutes per dose administered and average workload in dose administered yields time differential in minutes per work period.

Differentials in nursing labor cost for a single unit dose substation were based on engineering time studies. A single substation could serve four patient care areas that function at medication workload levels comparable to that of one unit. The amount of registered nursing time released from medication activities was 223 hours/month/ward ×4=892 hours/month/substation. Released time for other personnel was 936 hours. To convert these values of productive time into labor costs, allowance is made for the nonproductive portion of total working time. "Total nonproductive time per employee then equals 541 hours per year." The savings in labor cost for registered nurses are $4,820/month/substation and $245/month/substation for other personnel.

Differentials in nursing labor cost per patient day were determined. The average workload was determined to be 8.66 doses administered per patient day. Nursing time differentials per patient day are 13.2 minutes/patient day—registered nurses, and 1.88 minutes of paid working time for other personnel. "The savings in labor cost per patient day for registered nurses are $1.19 per patient day and 6 cents per patient day for other personnel."

Reassignment of selected medication administrative duties would release 157.0 minutes of registered nurses' time per day per patient care area. The saving in labor cost equals $873.65/month/substation and 22 cents per patient day.

The improvement in accuracy of charting fulfillment, as demonstrated by the unit dose system, affects the completion of the patient chart as a legal record and as a reliable monitoring document for the medical staff. An 11 percent improvement in accuracy is significant in relation to hospital revenue as evidenced by 50 cents per patient day.

"The most significant improvements result from characteristics of the unit dose system that are currently operated at University Hospitals; that is, the reduction in registered nurses' time and the improvement in charting accuracy."

Critique

The introductory portion of this master's thesis gives an excellent review of the investigations that have been directed toward hospital distribution systems. The study has been built upon previous research conducted on this subject. The discussion also highlights the nursing viewpoint of the misuse of nursing time and talents, drawing upon the study entitled, *An Investigation Of The Relation Between Nursing Activity and Patient Welfare,* (A16) as a basic document.

The design of the research is a standard before and after design. Great care was taken and tests were applied to assure that reliable data were obtained. Validity was based upon face validity. Findings were based upon data. The sampling was adequate. The reporting of the study was done carefully and in detail.

Many changes are made in supporting systems to nursing, but little attempt has been made to test their impact. This is a sound study that approaches a quantitative measurement of the effect of a change in a medication system upon nursing and upon hospital costs.

A67. Wandelt, Mabel A. "Uninterrupted Patient-Care and Nursing Requirements." Final Report, (GN-6901), Wayne State University, Detroit, Michigan, 1963.

Review

Purpose.—To explore the influences of an uninterrupted period of nursing care on the nursing care requirements of chronically ill patients and on the attitudes of personnel responsible for the care of the patients.

Hypothesis.—"If a chronically ill patient receives care for an uninterrupted period of time from a professional nurse, his care requirements, implied or expressed, will be modified and the attitudes of the nursing personnel responsible for his care will be modified—modifications will trend in directions judged desirable by those responsible for his nursing care."

Rationale.—There is a difference in task-centered care and individual patient-centered care. With functional assignment methods, patients feel that nursing personnel do not view them as individuals or have a deep interest in their welfare. The patient who receives patient-centered activities by one individual is confident that he will receive planned and appropriate nursing care.

Since this goal of nursing is to have patients resume the care of their own needs, an appropriate measure of effectiveness of nursing care is determined by the number of activities performed, time required to perform these activities, and number of requests for care made by the patients.

Nursing care requirements were also measured in terms of estimates of activities necessary for comprehensive nursing care of the patients as assessed by competent professional nurses. The number of activities assessed was calculated 4 hours and 21 hours following the uninterrupted period.

Change in attitudes of personnel is a measure of indirect effect of uninterrupted care because casual observations had indicated an apparent relationship and because attitudes seemed to determine patients' responses to care.

Chronically ill patients who have been hospitalized both frequently and for long periods of time are often considered "problem" patients. The majority of chronically ill patients in general hospitals are past middle age. Patients who received care from students (uninterrupted care) for 5 days and then had regular floor care for the 2-day weekend reverted to previous disconsolation (less optimistic and less willing to be independent) by Monday morning. The one basic element common to care given by students and different from care given by hospital staff was noninterruption. Noninterruption provides the opportunity to establish an interpersonal relationship. The cyclical complex of patient-personnel interactions is that the patient determines the care provided and the response of the patient determines the degree to which his requirements for care are met. Uninterrupted care may change the patient's response to care, followed by his requirements for care and consequently change the attitude of personnel toward the patient.

Variables.—The independent variable was the period of uninterrupted care. The uninterrupted period is the duration of time spent in administering care as determined by the nurse who gives the care. Fifty-five patients received care from 7 a.m. to 11 a.m. Eight patients received care from 3 p.m. to 7 p.m., a total of 63. Thirty-nine of these patients received experimental care from the nurse observers. Experimental care consisted of direct nursing care administered during an uninterrupted period and included the concepts expressed by Kreuter in "What is Good Nursing Care?" The other 24 patients received care from registered nurses, licensed practical nurses, and nurse aides.

Nursing care requirements were the dependent variable. To determine the change in requirements, four components were identified: • activities performed by personnel, • time spent performing activities, • requests by the patient for nursing care, and • activities assessed necessary by the nurse observers.

Personnel attitudes were identified as the indirect dependent variable.

Sample.—Harper Hospital in Detroit, Michigan, is a 690-bed voluntary, nonprofit, general hospital. It provides this clinical area for three types of nursing students, medical students, interns, and residents.

Data were collected from 3 p.m. to 8 p.m. The data from 16 patients that were observed after 8 p.m. were not used because the activity was too limited. The data for eight patients that were collected by time sampling were less stable than that obtained by continuous observation and, therefore, was not used in the analysis. There are data for 54 patients for the 4 hours following experimental care and complete care from 26 patients. Data analysis is based on 63 patients.

Instruments.—The instruments used in this study were the observation form, patient rating scale, record of experimental care, estimate of illness, interview forms, background information about the patient, special incident forms, and patients' selections criteria.

Observation form.—To measure the reliability of the observation form, interrater agreements or recordings were measured. During the 2-day orientation period, pairs of nurse observers observed four patients. During the study, two patients in the same room were observed by two nurse observers. The time, number of activities, and number of requests for these patients were recorded for a period of 8 days. All recordings of the four nurse observers were compared by analysis of variance. Since little change is expected in chronically ill patients, the same rank order from Day 1 to Day 2 was used as an indication of reliability of the observation form. No statistical difference could be demonstrated in the way the four nurse observers recorded time, activities, or requests. "The correlators between the measures gathered in Day 1 and Day 2 indicated a fair degree of stability."

To demonstrate the similarity in the manner in which four time samplers performed and the stability of a patient from Day 1 to Day 2, the data from two time samplers who worked 3 p.m. to 11 p.m. and two who worked 11 a.m. to 8 p.m. were compared. Three of the time samplers observed four patients each; one observed 16 patients.

The reliability of the interrater agreement on the observation form was determined in three ways. During a 2-day orientation period, pairs of nurse observers observed four patients. The correlation for time was .93, .95 for number of activities, and perfect agreement regarding the number of requests. During the study, two patients in the same room were observed for 8 days. The average correlation for time was .98; for activities it was .92. The number of requests by patient was the same for nine of the 16 patient days. The disagreement was in terms of one request. The four nurse observers' recordings were compared by analysis of variance for all the patients. No difference between time, activities, or requests recorded was demonstrated between Day 1 and Day 2 or among the four nurse observers' agreements.

The similarity in the manner in which four time samplers performed and the stability of the patient from Day 1 and Day 2 was based on data from 3 p.m. to 8 p.m. for each of four samplers. Three samplers observed four patients each and one sampler observed 16 patients. The correlation of recording time was .10, .11 for activities, and .11 for number of requests. An analysis of variance to compare the recordings of the four samplers on Days 1, 2, 7, and 11 showed no significant difference.

Time sampling.—To demonstrate the degree to which time sampling was similar to continuous observation, data from 18 patients were used. A continuous observer and a time sampler recorded time, activities, and requests on Days 1, 2, 7, and 11 between 11 a.m. and 3 p.m. An analysis of variance showed no significant interaction. Average coefficient of correlation between time sampling and continuous observation for the 4 days was .59 for time, .36 for activities, and .40 for requests. Discrepancies between recordings showed that the time sampler seemed prone to record more simultaneous activities than the continuous observer. The lack of stability of measures gathered by time sampling, the weak correlation between continuous observation and time sampling, and discrepancies in obtaining number of activities resulted in a decision not to combine the recordings obtained by continuous observation and time sampling.

Patient Rating Scale.—The test-retest reliability coefficient of the Patient Rating Scale was .73 using 50 nursing students and .89 for 16 personnel from a general hospital. The Spearman-Brown formula for split-half comparison showed .48 to .94. Interrater agreement obtained from the Pearson product-moment correlation based on independent pairs of raters and random pairs of raters ranged from .38 to .51. The ability to detect change in attitudes was evaluated by showing the film "This is Nursing" to 24 practical nursing students. These students rated the patient midway in the film on the rating scale and again after the film. The mean scores were compared by a "t" test and showed a statistically significant difference. Analysis of variance did not show significant difference in the way categories of personnel or persons from different shifts rated the patients. Therefore, mean scores from all raters were used to relate attitudes of nursing personnel to other variables.

Agreement between raters on estimates of illness varied from .06 to .72 using the Pearson product-moment correlation. Interassessor agreement as to nursing requirements assessment was evaluated by a 2×4 analysis of variance. Four assessors rated illness on Day 1 and Day 2. The assessment was a comparison of total number of activities and the agreement ranges from 40 percent to 60 percent.

Procedure.—Measurements of patient care requirements were taken on Day 1 and 2 to serve as baseline data. Each patient received uninterrupted care on Days 3 and 7. On Days 10 and 11, measurements of patient care requirements were again recorded. Day 7, which was the final day on which experimental care was given, was measured to record the expected maximum change. This was a before-and-after experiment with the patients serving as their own controls.

The patient was observed for 4 full days and 5 half days. Requests for nursing care were the only direct source of data from the patient. The nursing staff was observed. They responded to an attitude rating scale, recorded activities on a checklist, and provided experimental care. The nurse observers provided experimental care, assessed nursing care requirements, and estimated the severity of illness.

A master sheet was used to facilitate identification of all possible relationships of variables. Dependent variables were listed at the left margin and included assessed requirements, time, activities, requests, total scores, and resignation score.

Findings.—If a patient receives care for an uninterrupted period of time from a professional nurse, it was questioned as to whether or not he will require fewer nursing activities in the 4 hours immediately following care. Fifty-five subjects received care from nurse observers, staff nurses, licensed practical nurses, and nurse aides. The number of activities performed were compared on Days 2 through 7, 10 and 11 by analysis of variance. No matter who gave care, the number of activities performed by nursing staff decreased in the hours immediately following care and the effect was sustained to some degree.

Will that patient require fewer nursing activities in the later hours of the day? Data collected from 3 p.m. to 11 p.m. on seven subjects were compared on Days 2, 7, and 11 by analysis of variance. No difference was demonstrated between days and subjects. Twenty-six subjects were placed in two groups to compare data from the 3 p.m. to 8 p.m. period. The mean number of activities performed by nurse observers was more than the mean number of activities performed by nursing personnel.

Will the nursing care take less time to administer during the hours immediately following experimental care? Data collected from four groups of patients taken care of by different categories of personnel were compared by analysis of variance. To evaluate the day effect, "t" tests were used. The amount of time required in hours immediately following decreased but effect was not sustained to the 11th day.

The experimental nursing care will not always require less time in the later hours of the day. Of the seven patients, the time required for care from 3 p.m. to 11 p.m. decreased in four patients and increased in three patients. Data from 26 subjects showed that the 12 patients cared for by nurse observers required more time between 3 p.m. and 8 p.m. than did the 14 patients cared for by nursing personnel.

The requests, made by the patient immediately following his care, did not vary according to the type of care given as on the day test.

The patient will not make fewer requests later in the day. Most of the patients started with no requests as a baseline measure. Based on the 26 patients cared for by nurse observers or other personnel, the number of requests increased on Day 7. A Friedman two-way analysis of variance was used.

Data showed that the attitudes of personnel toward the patient did not vary between patients given care by nursing observers, registered nurses, licensed practical nurses, or nurse aides.

Critique

The effects of nursing care on the patient is a broad area for study and its measurement has proved extremely difficult. Individual differences in patient needs create a situation in which individual patient nursing care is required. Categorization and assessment in this area are extremely complex.

Wandelt attempts to assess the effects of uninterrupted patient care on nursing care requirements of the chronically ill patient and on the attitudes of personnel responsible for the care of the patient.

The theoretical framework of the study is poorly developed. Premises in regard to patient and personnel attitudes are based on casual observations. Rationale for the study is weak and inconclusive. A literature review is omitted, but a large bibliography is provided. (A glossary of terms is provided for the purpose of the study.)

The experimental methodology is employed—a before and after design. The independent variable studied was the period of uninterrupted care: (a) the time of day and (b) the varied classifications of nursing personnel providing the care. The dependent variables were the care requirements: (a) activities performed by personnel; (b) time spent performing activities by nurse observers, (c) requests made by personnel, and (d) activities assessed by nurse observers. The indirect dependent variable was personnel attitudes. The quasi-dependent variables are (a) patient's interest in getting well, (b) patient's condition, and (c) estimate of severity of illness. Extraneous variables accounted for are: (a) statements of physicians in regard to patient's condition, functional components, anticipated progress and prognosis; (b) statements by the head nurse in regard to the average amount of nursing care required, patient's interest in getting well, and family attitudes toward the patient; (c) patient's personal background data; and (d) medical data. Evaluation of the nursing care by the patient is omitted. Reasons for this omission supplied by the investigator are inappropriate for the reactions of the patient will in a great degree be determined by his opinion of the nursing care provided him and his relationship with the nurse providing it.

Development of instruments is not described. Samples and guides for their use are included in the appendixes. The sample (63 patients) randomly selected is adequate. Selection procedures are described and acceptable.

This study leaves much to be desired although there were attempts to measure agreement of observers and to make comparisons longitudinally. Rationale for the study is lacking and variables pertinent to validity of this study are not assessed. Too many assumptions are made by the investigator in regard to rationale, the instruments, interpretation, design, and results. It appears that this would be an interesting area for study but, due to its deficiencies, this study does not contribute to nursing staffing research design.

A68. Weeks, Lewis E. *The Complete Gamut of Progressive Patient Care in a Community Hospital.* Battle Creek, Michigan: W.K. Kellogg Foundation, (no date).

Review

Purpose.—To test the practicability of a six-unit progressive patient care program by several specific studies as well as by an organizational and historical review.

The research was conducted in McPherson Community Health Center, Livingston County in southeastern Michigan.

Method.—Three 120-day patient profiles were conducted, the first of which was conducted before progressive patient care was in full operation and the other two after progressive patient care was fully operative. Two samples of randomly selected patients were chosen each day of the 120-day period.

To determine if a distinct patient profile for each of the progressive patient care units emerged, data were collected on patients' conditions, care needed, and services rendered. A form enabled the nurse to express her opinion as to the patient's ability to care for himself, conditions requiring special care, specific orders, and also her opinion as to whether the patient was assigned to the proper unit. From the patient's chart, information regarding services, medication, and special care was obtained.

In order to determine the best utilization of nursing personnel, a work sampling study made prior to the progressive patient care period was compared to two studies after the progressive patient care was in effect. "A Modified U.S. Public Health Service work sampling methodology was used." Observers were experienced registered nurses. The sampling period was 10 days, 7 a.m. to 10 p.m. The method consisted of the nurse observer walking through the nursing unit at 12 to 15 minute intervals. She observed what each of the nursing personnel was doing at the moment seen and recorded this in terms of bedside care, care directly related to patient care, activity not related to patient care, and free time. The work sampling study was done in intensive care units, continuing care units, and intermediate care units.

Special cost finding studies were undertaken by the hospital's public accountants. "A step-down cost allocation, according to the method outlined by the American Hospital Association, was used."

Questionnaires and interviews were used to assess the opinions of physicians, employees, and patients about progressive patient care. Letters were sent to 100 current and former patients asking them about their reaction to home care. Over 50 percent responded to the letters. Fifty-seven former self-care patients responded. (Report does not include format of the letter or the total number sent.) Each patient discharged from the hospital was given a questionnaire asking for opinions.

All 22 of the physicians on the active staff were sent and responded to a questionnaire to determine their experience with the progressive patient care program and their opinions of its efficacy. Over 50 percent of the 207 full-time health center employees answered a questionnaire about progressive patient care.

Findings.—Intensive care patients need and receive more care, more service, and more medications. The continuing care patient profile shows patients of this unit are second only to intensive care patients in the need for nursing service. In surveys made of the data to determine if there were intermediate patients who should be considered possible transfers to intensive care, an average of three relatively sick patients per day were discovered in intermediate care.

Regarding misclassification of patients, nurses agreed, or did not disagree, with the physicians' assignments. Yet records showed that, on an average, as many as 11 or 12 patients in intermediate care were candidates for self-care.

In intensive care, the nursing staff spent 33 percent of the work time in bedside nursing care compared to 20 to 25 percent in continuing care and 15 to 20 percent in intermediate care. The percentage of idle time remained a fairly constant percentage, except that there was an increase in idle time among nurse's aides when practical nurse students were assigned to patients. Exclusive of intensive care, the contribution to care made by the licensed practical nurse increased. A study of common activities and the shift and hour in which they occurred was obtained from observation of the self-care nurse.

Non-progressive patient care and progressive patient care unit costs seemed to change about the same. Blue Cross reimbursable per diem inpatient costs for Michigan in comparison with McPherson Blue Cross costs show McPherson costs remaining practically constant while the average Michigan costs rose 4 to 5 percent. Continuing care and self-care proved to be more expensive to operate than had been anticipated.

All respondents said they liked home care. Some areas of apprehension were noted in the self-care respondents. Reaction of patients in general was favorable.

The opinions of physicians about progressive patient care were generally favorable.

Eighty percent of the respondents to the employee questionnaires said they believed patient care under progressive patient care was better than that given before the program was put into effect.

Conclusions.—The McPherson experiment demonstrated to the satisfaction of the study group that progressive patient care is a workable system:

- There was better utilization of employees under progressive patient care.
- Progressive patient care is more economical to operate.
- Intensive care and home care are outstanding.
- Continuing care proved to be more expensive than anticipated.
- Self-care units should be filled to capacity.
- Outpatient department is not tightly organized.
- Progressive patient care needs careful management.

The most important characteristic of progressive patient care is that the hospital is organized to give specialized care for different degrees of illness.

Critique

Progressive patient care is one program developed in an effort to improve patient care and utilize personnel to a greater advantage. The majority of large hospitals have adopted this program, at least in part, with rewarding results.

In order to evaluate the total progressive care program, the brochure written by Weeks describes in general terms the complete six unit progressive care program and the research effort carried out in one small study hospital. Insufficient information is provided to adequately assess the research design of the study. Rationale for the study is sound. The development of the research setting is described.

The methodologies employed in the study are work sampling, questionnaires, and interviews. The development of instruments is not described. Some instrument samples are included. Samples of data appear to be adequate.

Quality of care is assessed through opinions of doctors, hospital personnel, and patients. It is assumed that more appropriate staffing and specialization of staff will result in improved patient care quality. Greater efforts should be expended in this area.

The brochure provides interesting reading. It is well written and should instill in the reader sufficient incentive to further investigate the program. Hospital and nursing administrators, particularly those not acquainted with the program, would find this information useful. The study is directly related to staffing but suggestions for prediction of numbers and kinds of staff are not included.

A69. Weeks, Lewis E., and Griffith, John R. *Progressive Patient Care, An Anthology.* University of Michigan, Bureau of Hospital Administration, Research Series No. 3, Ann Arbor, Michigan, 1964.

This anthology is comprised of 38 chapters, each written by a different author or combination of authors and each chapter dealing with a topic concerned with an aspect of progressive patient care. Six chapters were selected as having pertinence to the question of staffing. These appear below with the authors.

"Progressive Patient Care—Planning and Research"
Edward J. Thomas

Review

Progressive patient care is defined as the systematic classification of patients according to their medical needs. The four main divisions of progressive patient care that have evolved are special care units, intermediate care units, self-service units, and continuation care units. These broad areas shade into one another and form a continuum of care based on medical need.

The steps taken to establish the program of progressive patient care at Manchester Memorial Hospital are described in detail. Convincement through involvement is identified as the key factor in opening the unit 1 year after conception of the idea.

The USPHS research team began to study this progressive patient care concept 3 months after the beginning of the program. The five major management problems under study were: • patient recovery patterns; • acceptance by patient, family, community, and hospital personnel; • effective utilization of medical and nursing personnel; • costs to patients and hospital; and • type of facility that best meets overall patient needs. In the absence of available baseline data, the research team described this hospital prior to and after the establishment of progressive patient care. The problems studied were management profile studies, refined cost studies, nursing function studies, medical records studies, and listing of comparisons of records 3 months before and after progressive patient care was instituted.

Six research proposals evolved after 1 year of observation by the research team. Three of the proposals given priority were allocation of beds, staffing patterns and nursing criteria, and continued detailed study of cost based on bed allocation and staffing patterns.

Two case histories are described to support the main advantages attributed by the research team to the progressive patient care program.

The most impressive collateral development of progressive patient care is patient satisfaction as shown in response to questionnaires. The medical records department has been overhauled; coordination and communication on patient transfers have been reorganized. The pediatrics department is using the special care unit and plans to establish a self-service unit.

The essence of progressive patient care is that doctors, nurses, trustees, and administrators cooperate, each contributing to a high level of patient care.

"Nursing Patterns Vary in Progressive Care"
Faye G. Abdellah, et al.

Review

Purpose.—To survey non-federal general hospitals containing progressive patient care units.

Sample.—Seventy-one intensive care areas were compared. Each hospital was a community hospital of between 200 and 400 beds and provided services for short-term medical, surgical, and obstetrical patients. Three hospitals whose predominant organizational pattern was progressive patient care were studied. One hospital had all five elements; the other two hospitals had four elements of progressive patient care.

Instrument.—Mailed questionnaires and a series of hospital visits. A core study of three hospitals was used.

Procedure.—Staffing patterns were derived for each area by computing the ratio of the number of nurse hours per bed for each category of nursing personnel.

Results.—The nursing hours for intensive care patients ranged from slightly more than 10 hours to 1 hour per bed per day.

The variability of criteria for admission to the intensive care area is reflected in the amount of nursing care given.

Three hospitals are specially analyzed as follows: Hospital 1 provided more professional nurse hours per bed in all areas except in the self-care unit. The same staffing requirements were maintained in the intensive care unit for the entire 24-hour period. Hospital 2 offered the fewest total and professional hours in the intermediate care and intensive care units. The nursing staff was less at night. Hospital 3 had the largest total number of nurse hours. The practical nurse was used more and staff was decreased at night.

Reasons given for the differences in nurse staffing patterns are the utilization of nonprofessional nursing personnel, the size of the facility, the type of patient cared for, and the physical design of the facility. There is a question as to whether the use of practical nurses should be viewed as a supplement or replacement for professional nurses. The size of the intensive care units ranges from four to 62 beds. Four of the 71 intensive care units were more than 30 beds. The type of patient admitted, the degree or intensity of illness, and the length of stay of patients influenced the nurse staffing pattern. A study of the unit design indicated that care units are in a transitional stage of development.

Four hospitals are analyzed in terms of the intensive care unit, future plans, and the self-care unit. Diagrams of the units are presented.

"How To Allocate Progressive Care Beds"
Charles D. Flagle

Review

A 2 year study was conducted at Manchester Memorial Hospital to help hospitals that are considering a progressive patient care program to determine bed needs in the various units. The two parts of this study were the evaluation of patient census based on care requirements and the computation of bed needs for each unit.

The four major steps involved in evaluating census are a designation of a patient evaluation team, the development of a patient-condition checklist, a criterion for patient classification, and an evaluation and classification of patients' system. The hospital administrator may be included with medical and nursing staff on the patient evaluation team. The patient-condition checklist should be sufficiently detailed to enable the team to reach an objective decision as to the unit in which the patient belongs. The checklist should incorporate such patients' needs as need for nursing observations, need for physical assistance, need for special medical or nursing skills, and/or special equipment.

The patient evaluation team should agree on the patient conditions that will constitute the criteria to admit to or discharge from a patient care unit. Three weights to be used in classifying patients are the compelling indicator, moderate indicator, and contraindicator. One of these three weights should be assigned to each patient-condition and level of intensity. The suggested criteria may be modified to meet the needs and practices within a hospital as determined by the patient evaluation. Nursing personnel should be trained in the use and application of a patient classification checklist. An example of a form that can be used for the patient's entire stay is presented. The design of each checklist should incorporate the hospital's criteria for patient classification. The assignments should be reviewed for overriding considerations of policy, such as the patient who is to be discharged from the intermediate care ward. Census observation days or recording the number of new patients entering intensive care and their length of stay are two types of procedures to be used to estimate the average census of each of the care units.

The second phase of this research study was the computation of bed needs that includes variations in census. One way to achieve such flexibility is providing some beds that may accommodate either one of two categories of patients. Flexible areas should be adjacent to units designed for only one purpose. The steps to follow in calculating the number of flexible beds and the size of patient care units are based on average census and are outlined in detail. A table is included that indicates the average census and the corresponding number of flexible beds to be considered.

This "Progressive Care Plan for Five Areas of Service" was written by the staff of the *Modern Hospital* where it appeared in Vol. 59, No. 3, and is reprinted by permission.

Review

Purpose.—To show the steady growth and continued development of the progressive care Plan at St. John's Hospital in St. Paul, Minnesota.

The eight-bed special care unit was the first to be opened. Carl Ave Lallemont, administrator, describes the function of the five special units.

The 20 minimal care beds of semiprivate rooms are intended for patients who are able to help themselves and this section is designed accordingly. The unit offers definite advantages to the ambulatory patient, better utilization of hospital personnel, and lowered maintenance costs. One nurse is assigned to this unit in contrast to the five registered nurses, three aides, and two practical nurses for every 50 beds in the general care division.

The intensive care unit consists of eight beds in semiprivate rooms staffed by two registered nurses and one aide. The rooms on the unit maintain special equipment.

Twenty beds comprise the rehabilitation unit. The purpose of the unit is to "graduate" the patient from general hospital care to maximum self-care. This unit contains a four-bed women's ward, a five-bed men's ward, one private room, and five semiprivate rooms. Handrails in the hallway and in the bathroom and a lounge are a part of this unit. The employees in this area are specially trained in the techniques of rehabilitation. Staffing requirements are slightly in excess of the number of personnel in the general care unit because of the need for constant observation and teaching.

The purpose of the extended care program was to help provide continuity of service under the direction of the medical staff to patients during hospitalization and after discharge. The assistance includes nursing care, emotional support, health education, and rehabilitative procedures. The results show shorter hospitalization per patient, better public relations for the doctor and the hospital, greater continuity of care, and saving of physician's time.

"Progressive Patient Care: A Preliminary Report"
Howard J. Lockwood, et al.

Review

The initiation and development of a progressive patient care concept at Manchester Memorial Hospital is described. Reference is made to Dr. Charles D. Flagle's (at Johns Hopkins Hospital) work measurement study of the time needed to care for the three categories of patients: intensive, intermediate, and self-care. Progressive patient care is defined as the systematic classification of patients according to their medical needs. Committees headed by physicians and composed of other doctors, administrators, nurses, trustees, dietitians, housekeepers, and other involved persons were established for each of the three proposed units.

The special care committee catalogued patients to determine the number of special care patients present at any given time. An appropriate area was selected. Other hospitals were visited to study units and facilities. The nursing department developed staffing patterns. Necessary equipment and medicaments were tabulated by the physicians. Special nursing procedures and techniques were considered. Nursing routines were established and special charts were developed. After the plans for each of the three units were submitted to the medical staff for approval, the program began.

Based on a study of five acute general hospitals in Boston by Rosenfeld and Associates which found that 3 percent to 9 percent of patients in an acute general hospital suffer from chronic illness and require a large amount of nursing time, a chronic care committee was formed. The problems of chronic disease patients are handled by the nursing staff guided by the philosophy aimed at returning function to the level of activity of daily living.

The results of the institution of progressive patient care are described in relation to the three units. The presence of the special care unit enabled all emergency patients to be admitted without delay, bypassing the admitting office. Essential emergency supplies and equipment were kept in the unit. Three facilities were essential: (a) an open area for observation, (b) private accommodations to control environment, and (c) a flexible zone of semiprivate beds. Men and women shared the open area. The unit took over the function of the recovery room after 4 p.m. All the nurses in the special care unit were trained to administer fluids intravenously, eliminating the need for an IV team in the hospital. The flexible zone allowed a rapid shift of patients without disrupting the care in other areas.

The level of nursing care on the intermediate units was relatively stable. The unit was comparable to the routine nursing area of the acute general hospital. The majority of patients have been admitted to, remained on, and gone home from this unit since their medical needs remain constant.

The self-service care unit handled therapeutics, post-surgical convalescent, and diagnostic ambulatory patients representing a sizable proportion of the acute general hospital population. The unit allowed the diabetic to be studied and trained in self-care and diet maintenance. The postcoronary patient regained confidence and the mild depressive was handled well on this unit. The convalescing patient was no longer disturbed by an acutely ill roommate.

In the continuation care unit, nurses provided care centered about a program directed at the activities of daily living.

The benefits of the program are briefly reviewed. The potentialities and flexibilities of progressive patient care answer patients' needs. This type of change necessitates that hospital trustees, administrators, nurses, and medical staft should be involved in the beginning. The physical configuration and equipment vary from one unit to another. As the patient moves from one ward to another, these variations act as psychological stimuli to the patient in his adjustment process—the nature of the physical environment connoting his improvement level.

Costs of room, board, and nursing charges per patient were $26 dollars per day in the special care unit, $20 per day in the flexible zone unit, $18 in the intermediate care unit, $18 in a semiprivate room, and $11 in the self-service unit. The patient who enters the special care unit saves a large portion of the $54 per day for private duty nurses. The self-service unit allows a surplus of $1 to $4 per day using the Blue Cross in Connecticut's average cost of $12 to $15 per day. The State average for discharge is 41 per day while the discharges at this hospital were up to 51. The average stay at Manchester Memorial Hospital was 6.4 days in contrast to the State average of 7.6 days.

A comparison with 17 other hospitals reveals fewer employees per hospital bed and higher wages and salaries. The total patient cost per day is 20 percent less. After the institution of the progressive patient care program, the total hours of nursing care per patient increased to 4.6 from 3.2 total hours of care per patient. The breakdown of nursing time according to units was 6.3 hours for special care, 3.9 hours for intermediate care, 2.5 for self-service units, 7.5 in the continuation unit, 3.7 for obstetrics, and 3.7 in pediatrics. The nursing salaries were raised 32 cents an hours and currently are higher than in any other nonprofit voluntary hospital in the State.

The objective of better care has been achieved at no greater cost to the patient.

"Progressive Patient Care"
Faye G. Abdellah and Josephine Strachan

Review

Progressive patient care is defined as the organization of facilities, services, and staff around the medical and nursing needs of the patient. The fully developed program consists of the intensive care unit, the intermediate care unit, a self-care unit, a long term care unit, and a home care program.

The Division of Hospital and Medical Facilities of the USPHS organized a 16-member research team consisting of hospital administrators, physicians, nurses, architects, equipment specialists, dietitians, social scientists, biostaticians, a medical records librarian, and a cost analyst.

The goals of the team were to study the program, to define a progressive patient care program and its specific elements, to identify the major components that could be measured, to determine the baseline for medical, nursing, and dietary practices, architectural and cost patterns for 1 year prior to and 1 year after the program started.

The modifications of existing nursing practices were examined. The intercommunication system in the special care unit enables the nurse to talk to those outside the unit while maintaining auditory and visual observation of her patients. The professional nurse plans the care for all her patients and directs the work of team members who may be licensed practical nurses or aides. The professional nurse starts all intravenous infusions and draws blood specimens. The practical nurse and aide carry out many technical procedures including suctioning tracheostomies, temperature, pulse, respiration, blood pressure, and testing urine for specific gravity. Private duty nurses are not present in this unit. Patients may be admitted directly to the unit without time consuming admitting office procedures; however, this practice increases the nurse's responsibility, as judgment, alertness, and anticipation of treatment needs become all important. Nurses must be skilled in all fields and be especially alert in observing signs and symptoms of possible complications. Technical competence, skill in giving direction and guidance, physical, mental, and emotional ability to meet day-to-day crisis are essential.

In the intermediate care unit, the nurse has special responsibilities for insuring the patient's full recovery or helping him accept the limitations that his illness may impose. Supervision of activities, teaching of good health practices, understanding of patients' emotional problems and reaction to illness are important.

Much of the care on the continuation care unit can be provided by practical nurses and nurse aides under professional nursing supervision. Patients and nurses plan care cooperatively.

One registered nurse or one licensed practical nurse for each shift represent the staff on the self-service unit. The nurse has opportunities to talk with patients and answer questions. There are opportunities for health teaching and counseling. A nurse who enjoys teaching, can relate to many types of people and has a warm outgoing personality is an asset to this service.

M. Vera Dromer, Director of Nurses, provided invaluable assistance in carrying out a number of exploratory studies to develop a matrix of hypotheses from which a specific hypothesis could be selected for later study. A study of patient satisfaction with nursing care under the progressive patient care program showed these patients to be much more content than the average patient in the national study. "Lack of explanation of care," "not seeing a nurse long enough," and "waiting to have the light answered" were complaints that were reduced or eliminated at Manchester. It is easier to determine the patient's physical readiness to move to another unit in the progressive patient care concept than it is to determine his emotional readiness. The patient may also feel that high quality nursing care is only available on the intensive care unit.

Two studies were carried out concurrently to determine the nursing functions and skills required on the different units. Patients were rated on their need for physical or hygienic care, observation of physical signs for symptoms, medications and treatments, instruction, diagnostic and therapeutic care, and observation of behavior. Four categories were developed ranging from the greatest amount of skilled technical nursing care to the least amount. At the same time a nurse utilization study was done following the USPHS pattern to find levels of skill required on various units and to find clues for staffing patterns. It was hoped that two broad categories of nursing skill would be differentiated: technical is one area and the teaching and human relation skills comprise the other broad area. Findings showed that patients in the intensive care unit required continuous physical care, demanding more technical activities than any other unit. Much of this work could be carried out by practical nurses or aides with professional nursing supervision. Patients on the intermediate units were learning to plan their care. These patients needed increasing amounts of emotional support and teaching to prepare them for their discharge home, requiring teaching and human relations skills on the part of the staff. On self-service units, the teaching, human relations, and rehabilitative skills required a high level of professional nursing competency. Technical skills were minimal. Grouping of patients with similar needs permitted more effective assignment and utilization of nursing skills. Nurses on progressive patient care units spent more time on activities with the patient. Daily classification of patients' needs and appropriate transfer are necessary.

A statistical study of employment and resignation figures, both before and after progressive patient care, was conducted by the Director of Nursing and by Eugene Levine, Chief of the Research and Statistics Branch, Division of Nursing Resources, USPHS. Turnover of administrative and nursing personnel was less at Manchester than the national average and became lower after progressive patient care was established. Instability rates were also lower than the average at Manchester and increased much less than expected after the reorganization.

Implications of progressive patient care for nursing service and for nursing education were drawn from many interviews with nursing leaders, physicians, and hospital administrators. Nursing personnel planning for total nursing care must be prepared as "generalists" and specialization by type of service may no longer be needed. Coordination of patient care is emerging as a major responsibility. Two types of roles may be the professional nurse therapist and the nurse technician. The student may need to spend more time with patients to learn the "whole" patient. Hospitals with all five phases of care can provide clinical experience in which the nurse can learn to solve basic nursing problems. The 3-month per service assignment is not realistic. Communication skills, how to teach, how to plan and organize work, methods of problem solving, and understanding of patient behavior are required skills in addition to the skills necessary for physical care of the patient. Present methods of evaluating performance on the clinical unit are not adequate.

Critique

The concept of progressive patient care is not a new one. It has been in effect in varying degrees since the beginning of hospital organizations. Hospital organization based on progressive patient care concepts has proved to be an asset in realizing the principles of comprehensive nursing care.

This anthology is a comprehensive digest of experiences, opinions, and research studies reported by 53 well qualified persons in their speciality areas. Enumerable aspects of the program are discussed, beginning with a discussion of the elements of progressive patient care and the development of the program. Evaluation of the program, its affects on patients and personnel, social aspect, architectural design, and cost are included.

Considerable emphasis is placed on the patient care required. This is based primarily on numbers and kinds of medications, treatments, instruction, diagnostic and therapeutic care, and the skill level of the nurse required to perform the care function. Methods for selecting and categorizing patients in a particular level of care, before and after studies of progressive patient care, and methods of moving patients from one care area to another receive extensive consideration. At some point, there appears to be an attitude that progressive patient care is a unification of workload types into categories. There is a deficiency in patient care quality assessment, though attempts are made in this area through the assessment of patient recovery patterns and patient and family acceptance of the program.

The major research studies in progressive patient care are reported but information in regard to their development and employment of tools for assessment are deficient so that proper assessment cannot be made.

This publication should be invaluable to all levels of nursing personnel and, in particular, to hospital and administrative personnel who are interested in developing progressive patient care programs in their hospitals. The contributions of this anthology to nurse staffing research design cannot be determined. It provides a fruitful area for continued research in the area of nursing care quality. It also presents some specifics about staffing derived from experience. These should be useful in the interim period while one searches for hard data on which to base predictions.

A70. Weir, Silas Michael. "Variable Nurse Staffing in a Progressive Patient Care Hospital." Unpublished Master's Thesis, University of Michigan, Ann Arbor, Michigan, 1968.

Review

Purpose.—This study concerns itself with "the ability of a medium sized PPC hospital to implement and sustain variable nurse staffing." Variable nurse staffing was established in the hospital in 1964, and was defined as a pattern of staffing in which • preset standards of hours of nursing care per patient had been preset for each unit, • only head nurses and supervisors retained fixed job assignment, • other nursing personnel were assigned to any unit based upon expected or actual census, • a cyclic staffing pattern for 7 days and a 7-week period had been set at an overstandard level for an average census of the total of 141 patients, and • policies had been established to provide for downward adjustments.

In the years 1967–68, deviations occurred in change of staffing practices, suggesting less flexibility. The author studied the changes, made comparisons, and tested simulations to learn if these would have made any difference in variations from standards.

Method.—Data about personnel and their daily hours of assignments were collected and punched on cards. The variables included: classification of personnel, time of day assigned, type of nursing unit assigned, total hours of nursing care, registered nurse total hours, hours of nursing care per patient, and hours of nursing care of registered nurse care per patient per day. The data were run by computers. Descriptive data (totals, mean, standard deviation, and percentages) were obtained.

The author found that the census distribution was variable, indicating the need for flexible staffing. The recent nursing patterns were less responsive to present census variation than those used in 1964.

The two schemes that he proposed for handling staffing for census variation were called Simulation 8 and Simulation 4. Simulation 8 was set so that every time the census reduced the shift hours below standard, 8 hours of nursing care were added. Simulation 4 was set in the same manner, with the exception that only four hours were added. The census data obtained for the study period and nursing care hours per patient per unit were then submitted to manipulation to learn what variations in nursing care hours per patient per unit would have occurred under each scheme.

Results.—Use of these policies resulted in greater stability around hour standards preset than actually occurred; however, overstaffing occurred in both.

The author points out problems that are created by both understaffing and overstaffing, calling "nursing failure" days (not meeting standards) as important, if not more important than days in which overstaffing occurs.

Critique

The problem of daily staffing is a chronic, irritating, and energy consuming one. Large amounts of time are spent on staffing changes, resulting in census fluctuations, particularly in special units, patterned after progressive patient care concepts, as proposed in the USPHS publication, *Elements of Progressive Patient Care,* (Publication No. 930–C–1). The methodology proposed in this report is helpful in reducing the data to a form in which it can be analyzed.

The report is extremely hard to read. The topics and the ideas are not always logically placed. Therefore, one has to examine and reexamine what is presented, checking back on the statements made by the author. His findings appear to be supported by the data presented.

The author does not draw upon any basic field of knowledge, nor does he refer to writings on staffing except two, those by Jelinek in *Health Services Research* and by Griffiths, *The MacPherson Experiment.* He overlooks, almost entirely, the human factor in staffing and the individual's personal feelings about being moved from one unit to another and to his being sent home with a full day's pay. A more serious question is the failure to recognize that the care requirements of different groups of patients may differ in the knowledge and skill demanded of the nurse, and that for her to keep current, her practice must be constant or at least repeated at sufficiently short intervals to minimize loss of knowledge and skill. His basic concept of movement of registered nurses, like replaceable parts, may be suitable if the nursing units are similar or if a staff development program is built to maintain the skill of the nurse. (But this becomes very costly. Whether or not they are that alike in this progressive patient care hospital, one could question.)

The primary value of the study lies in the methodology suggested for testing a change in policy that provides for additional increments of staff on an 8 or 4 hour basis. Since nursing work has an inherent variation, this author's work is related to the questions of nurse-staffing methodology. The major flaw in the study is the logic he applies in establishing flexibility for staffing.

A71. White, Ruth Preston; Quade, Dana; and White, Kerr L. *Patient Care Classification: Methods and Application.* Research Report, (NU 00080), Bureau of Health Manpower, USPHS, July 1967.

Review

Purpose.—The purpose of this study was to determine the degree of agreement between physician and nurse classification of patients into self-care, intermediate care, and intensive care categories and to identify criteria that would permit optimal agreement between physician and nurse classifications of the same patients. The hypothesis proposed was: "more sensitive and discriminating criteria for classification of patients will result in greater agreement between physican and nurse classification of the same patient."

Method.—Data were obtained from four patient care classification surveys (two concurrent surveys in two university hospitals). A total of 2,712 patient days were included in the sample.

"Data from North Carolina Memorial Hospital were obtained during another study in the fall of 1961. . . . The methods for collection of data from North Carolina Memorial Hospital was previously devised by Flagle, et al. . . . For use in this study, data from the concurrent surveys were contained in duplicate IBM cards and also the original nurse and physician patient condition checklists for the same patients."

The two concurrent surveys conducted at Mary Fletcher Hospital in 1963 utilized the same method of data collection with some modification in form to obtain additional information for this particular hospital's use. As devised by Flagle, the surveys used were (examples):

- an inpatient nursing condition survey, and
- a bed sample survey.

The Inpatient Nursing Condition Survey, a patient condition checklist, provided the necessary information for the nurse to classify the patient needs each day into three major categories:

(a) self-care,
(b) intermediate care,
(c) intensive care:
    1. strict and
    2. moderate

A Bed Sample Survey consisting of a daily 10 percent random sample of all hospital beds provided the physicians' classification. For all occupied beds, the staff physician on the service indicated which of the following levels of care was needed for his patient:

- intensive care;
- intermediate care;
- self-care;
- long-term care;
- overnight care or close proximity to clinics;
- observation work or short term, near emergency room;
- outpatient care or consultant and diagnostic;
- nursing home care;
- organized home care; and
- home.

"The validity of the studies rests on the assumption that the use of patient care facilities is based, in large measure, on the subject's opinion and decisions of the physicians and nurses who give the care."

To determine a measurement of agreement between physician and nurse classifications, two statistical tests were used:

(a) reliability *or* R, and
(b) G

If P_c = probability that if two patients are chosen at random, then nurse and physician will place them in the same order and

P_d = probability that nurse and physician will place them in opposite order

$$\text{then: } G = \frac{P_c - P_d}{P_c + P_d}$$

Tables are provided that show agreement of nurse classifications with physician classifications by selected types of care, by age, race, sex, type of service, and hospital.

The R test proved to be the most meaningful statistical test for a measurement of agreement. For one group of patients (1,163 days), R was .67 and for another (1,303 patients), R was .64.

Various methods were employed to analyze patient classification criteria. Combinations of criteria were studied to attempt to arrive at a "rule" for the most discriminating criteria in order to provide for optimum agreement in nurse-physician classifications. A less functional approach was also used in an attempt to obtain nursing criteria for patient-care classification. (Less Function 1, 2, and 3.)

Another approach to obtaining a good classification rule utilized a "normal-theory discriminant analysis situation." Four different analyses of a general type were considered: Analyses A, B, C, and D. (Regression analysis plus less function.) Many tables were included.

Conclusions.—No one patient characteristic alone was found to cause the great lack of agreement.

Attention was turned to the nursing criteria in use. Of three identified, six specific criteria were selected as being most influential in patient classification and were chosen for analysis. These were:

- temperature, pulse, respiration, and blood pressure,
- suction;
- oxygen therapy;
- bath;
- dietary; and
- mobility.

("Bath" is best for distinguishing self-care from others.)

A simplified list of five nursing criteria was then developed for use as an improved classification system. This list was:

(a) TPR and/or blood pressure,
(b) oxygen therapy,
(c) suction,
(d) bath, and
(e) dietary.

Critique

One of the greatest problems posed by the progressive patient care program involves the selection of criteria for the classification of patients into appropriate levels of care. Since appropriate and successful patient classification methods are fundamental to the success of the program, the search for more efficient and accurate methods for classification present a fertile area for study.

White's study involves an investigation into the degree of agreement between the physician and nurse in the classification of patients into self-care, intermediate care, and intensive care categories and the determination as to which criteria will permit optimal agreement between physician and nurse classifications of the same patients.

Rationale for the study is acceptable, for agreement of physicians and nurses in the categorization of patients is most important to the success of the progressive patient care program. However, due to the differences in orientation in regard to the patients' care, securing perfect agreement in the assignment of patients to care categories will create many problems and, if a limited number of criteria are found where there is perfect agreement, will these criteria be discriminating enough for adequate categorization? The assumption made by the investigator that the physician's categorizations were correct seems less than desirable, for the nurse usually spends more time with the patient, is more aware of changes as they occur, and is certainly more aware of the nursing care requirements of the patients.

This study is in some degree an extension of the studies previously conducted at North Carolina Memorial Hospital, Chapel Hill, North Carolina, and Mary Fletcher Hospital, Burlington, Vermont. A modified version of the data collection method developed by Flagle is employed. Three major categories are used for classification of patients: (a) self-care, (b) intermediate care, and (c) intensive care (strict and moderate). Patient characteristics studied in addition to types of care are: age, sex, race, and type of medical service. To determine discriminating patient classification criteria, temperature, pulse, and respiration; hemorrhage; consciousness; vomiting; mobility; dietary; orientation; oxygen; suction; and restraints are studied singly or in combination. Samples are adequate.

This is an interesting and readable study. A literature review is not included but a large bibliography appears at the end of the study. Development of instruments is not described but samples are included. Results are presented in table form. Insufficient information is provided to adequately assess any contribution to research design that this study might make. For persons interested in patient care classification method, this study should prove to be helpful and interesting.

A72. Wolfe, Harvey. "A Multiple Assignment Model for Staffing Nursing Units." (GN-5537, HM-00279, and FR-00004), Unpublished Doctoral Dissertation, Johns Hopkins University, Baltimore, Maryland, 1964.

Review

Purpose.—"The goal of this research is to produce a pattern of staffing which will meet the qualitative as well as the quantitative needs of patients on the unit."

Location.—Johns Hopkins Hospital.

Methodology.—The problem of staffing a nursing unit is approached by means of a linear programing formulation using the multiple assignment model. The multiple assignment problem is such that there are "n" individuals and "n" tasks and each person is permitted to do more than one task. The problem is to assign tasks so that no person has more tasks to perform than can be done in one working period. The objective is to minimize the total cost of making assignments. The total cost is composed of two separate costs. The first cost is the actual cost of a particular assignment; the second cost takes into account that no person can be hired to work a fraction of a working period. The latter quantity indicates the amount of nonproductive time for individuals.

Integer linear programing is a technique for solving linear programing problems and a very small multiple assignment, i.e., one with three classifications and four tasks is chosen for analysis. The use of integer linear programing to solve this problem is illustrated. This solution satisfies integer requirements and can be considered the final solution to the problem (p. 107). By lifting the integer constraint, a first feasible solution is generated. This sacrifices assignment costs in order to reduce nonproductivity costs, such that the total cost of the multiple assignment is made smaller (p. 111). Applying long range multiplier technique requires many fewer steps to attain and thus has value as the size of the multiple assignment problem increases. Problems with approximately 50 variables or less can be solved, a large percentage of the time, using an integer linear programing algorithm in a computer. No program has yet been written to accommodate more than 100 variables. Therefore, a heuristic approach can be used. The result obtained through this procedure is not necessarily the minimum cost solution to the multiple assignment. It is not possible to know if there is a sequence. Neither is it possible to know if the best solution is obtained by using the algorithm described (p. 145).

Three sets of parameters must be provided for the multiple assignment problem: (a) the availability of various personnel categories, which is dependent on the 8-hour workday; (b) the daily nursing time required to carry out each task complex, which is based upon a work sampling study; and (c) cost of category personnel performing task complex. The salary cost is easily obtained but "the qualitative cost presents some difficulties."

In order to estimate the amount of time needed to adequately provide each task complex, a work sampling study was conducted. Samples of nursing activity were taken over a period of 2 months covering the 7 a.m. to 3 p.m. shift on weekdays. The observers were chosen from a group of registered nurses and senior student nurses who were interested in devoting a portion of their time to nursing research. Two floors were visited during each 24-minute period. Each possible activity that could occur on the unit was defined and included in a *task complex*. A specific task complex included all tasks of a similar nature which required a specified level of training. The timing of task complexes was rounded off to 30-minute intervals. Using the work sampling data, a correlation coefficient was calculated for each task complex with respect to each of the patient classifications. Each of these correlation coefficients was examined to see if it was significantly different from zero.

The last set of parameters that must be obtained is that expressing the cost relationship between a particular classification of personnel and a specific task complex. In order to compute this, it is necessary to derive a value scale reflecting certain qualitative aspects of a personnel category performing a complex and a salary scale representing the actual dollar cost of assignments.

Several sets of judgments were elicited from a group of raters to establish the existence of a scale of the qualitative aspect of nursing performance and to obtain a set of values in dollars to be added to salary costs. Individual sessions were held with 10 subjects, each of whom were asked to make judgments indicating the qualitative preferences as to which category of personnel should perform a task complex. They were also asked to place a dollar value on the *intangible* cost of performance. The participants included five hospital administrators and five nurses, all from Johns Hopkins Hsopital. The nurses had administrative or educational positions within the Department of Nursing. All the administrators had done graduate study in hospital administration. Each one was given a complete list of task complexes as described and descriptions of the qualifications necessary for the various nursing positions included in the study.

Each participant was first asked to assume the role of a patient and then give his order preference as to which level of personnel was to perform each task complex. The subject was also asked to assume the role of the administrator of a large hospital, divorce himself from the economic cost of personnel and only consider the qualitative aspects of nursing care. "The blanks were filled in with various classifications of personnel and the question was repeated for each task complex until a numerical value scale in dollars was obtained for the qualitative differences in performance capabilities." (p. 177) The rankings for the various task complexes appear to indicate a large amount of variation between judges. However, if one envisions some attribute, for example, the qualitative ability to perform nursing tasks, the orderings selected by the raters can be considered completely consistent and having no variability. Coombs postulates that if a single underlying attribute accounts for the preferences of the subjects, this attribute can be represented by a unidimensional continuum (p. 195).

The differences in salary cost among the various levels of personnel also provide a scale of the qualitative aspects of nursing care as recognized by the hospital. Recognition of the existence of an underlying continuum and scaling the qualitative aspects of performance of nursing care require that scaling methods be improved and new techniques be developed to yield more information upon which to base the quantification of the continuum.

The technique used in eliciting dollar cost responses to the qualitative aspects of performing task complexes falls into the category of subjective-estimate methods. It is assumed that the subject is capable of making these direct quantitative valuations of the amount of the attribute associated with each stimulus (p. 209). "The purpose of obtaining costs reflecting the qualitative aspects of performance of nursing care is for utilization in deriving the matrix for the multiple assignment problem (p. 212).

To implement the multiple assignment system, certain problems must be confronted. The time necessary to orient nurse administrators as to how to use the information provided by the model is substantial. A new plan of staffing would have to be given a lengthy trial in a controlled environment in order to determine the actual value of the system. No basis has been provided upon which the effectiveness of the system can be measured. In the absence of a measure to determine quality of care, the effectiveness of the multiple assignment model is impossible to assess. "When internally tested against its inherent measure of effectiveness, cost, it of course proves to be near optimal." "Since the multiple assignment model bases its internal validity to some extent on a qualitative aspect of nursing care, it is reasonable to expect this model will yield a higher level of quality of nursing care than previous systems."

To determine these factors that affect the quality of nursing care, a questionnaire was sent to a selected sample of persons who were felt to be knowledgeable and interested in nursing care. The particular names to whom questionnaires were sent were selected by a small group including a nursing educator, a nursing service representative, and the author. (The questionnaire is presented and a discussion of reliability and validity is included.) There were 155 respondents out of the 247 questionnaires sent. The respondents included 28 deans of schools of nursing, 29 directors of nursing, 21 members of nursing faculties, 10 directors of hospitals, 18 retired nurses and nurse administrators, 10 nurses engaged in research or consulting, 11 medical or public health faculty, and the remainder (28) in a wide variation of related positions. Of the 155 respondents, all except 13 were able to identify one or more factors that they felt affected quality of nursing care. Only items mentioned by at least five of the respondents were retained.

A committee consisting of a nurse educator, a representative from nursing service, a hospital administrator, and the author, proceeded to categorize the responses into broad classifications. Four classifications were derived: (a) those factors controlled by nursing with the hospital, (b) those factors controlled by nursing administration, (c) those factors controlled by nursing and hospital administration, and (d) those factors not directly controlled by the hospital. There was no attempt to assess the relative importance of any of these factors based on the frequency of response. The aspect of deriving a quality of nursing care metric is beyond this study, but it is speculated that some form of written examination, patient questionnaire, and ratings by superiors could comprise a nursing care measuring instrument.

One of the important bits of information that can be deduced from the quality factors survey is the multifactor nature of quality of nursing care. It is possible then to sample each aspect a number of times and find a value that will be normally distributed. For example, if a large number of patient questionnaires showed that the interpersonal relations factor is normally distributed, then a small number of measurements can be converted into a standard normal. Assuming the contribution of other factors varies, it is desirable to weigh each set of standardized random variables by a number indicating its relative importance to quality. In actual practice, once the distributions are known experimentally for each of the factors and weights for each factor have been derived using some psychometric technique such as the constant sum method, it becomes very simple to test whether a difference exists between various nursing units.

Findings.—The multiple assignment model takes into consideration both the qualitative and quantitative aspects of nurse staffing in arriving at an optimal solution.

Qualitative aspects of nursing care have been incorporated into the multiple assignment solution by constructing cost coefficients reflecting what qualifications are necessary to perform a particular set of tasks adequately. These cost coefficients reflect the judgments of nurses and administrators. These cost coefficients are a combination of salary costs and qualitative costs. These cost coefficients represent a measure of effectiveness for any particular assignment of personnel classification to a set of tasks.

The multiple assignment solution provides the decision maker with an estimate of how many individuals should be assigned to a particular nursing unit and what qualifications they should possess. The procedure for use of the assignment table is provided.

Two interesting side results were discovered in establishing parameters for the possible implementation of the multiple assignment method: (a) the discovery of a qualitative rating scale that has as its attribute the qualitative aspects of performing nursing care. This attribute appeared to underlie the preferences of nurses and administrators for having certain categories of personnel perform specific task complexes, and (b) current estimates of the time required to perform nursing activities were compared with those found 6 years ago by Connor, confirming his estimates of the average amount of direct nursing care a patient in Class I, Class II, or Class II received.

The effectiveness of the multiple assignment approach as compared with other staffing systems is undeterminable over a short period of time. The basis for such comparisons should be quality of nursing care, a concept for which no one has derived an acceptable quantitative measure.

A technique is proposed for obtaining a single index of quality of nursing care. This index is based on a survey of those factors affecting quality of nursing care as indicated by 155 individuals well known in the nursing and medical professions. Statistical manipulation of measures of these factors yields an index number that can be used to compare changes to see if quality of nursing care is improved.

The study has established what factors need be measured and has derived a method for combining the resulting measures.

Conclusions.—This formulation of the multiple assignment problem represents a new allocation model for operations research practitioners. It has been demonstrated that an optimal mathematical solution to the multiple assignment problem can be obtained through the application of integer linear programing techniques. The costs used in this study reflect an initial attempt by operations researchers to utilize costs that are composed of a combination of physical and psychological measures.

Critique

Wolfe's study evolves from the studies by other students of Flagle. It follows Connor's work by approximately 4 years. Wolfe extends the problem analysis of nurse staffing to an examination of the assignment of staff members, the cost, and the quality required in the performance. He is interested in the question of combinations of staff to care for classes of patients in the most economical means. However, Wolfe defines cost to mean more than the money involved. Cost also includes a value of the work to the organization. The problem Wolfe is examining is a highly pertinent one to staffing. Although he is looking at the fluctuating demands of workload, he also introduces the parameters of knowledge and skill levels required to perform the work and the use of standby time when no demand for skill level is present. The problem of the sequencing of the work by levels is not treated, but Wolfe implies that this must be considered in future research.

The problem is conceptualized well. The author provides an excellent theoretical framework describing both the stochastic nature of the demands for nursing service and the multiple assignment model that he utilizes. He draws exclusively upon the work done at Johns Hopkins by Connor on the classification of patients and reviews the development of the patient care index, the constant for indirect activity, and controlled variable staffing. The case that Wolfe presents for the advantages of linear programing formulation and the research related to it is simple and well stated.

The research is carefully planned and conducted. Wolfe proposes task complexes that would not be challenged by professional nurses, defining them carefully and describing knowledge and skill levels. The patient classification system is Connor's. Wolfe does not challenge its validity or the reliability of the data obtained. The timing of nursing activity provided patients of the various classes and grouped into task complexes is a model for others to follow. The procedure is carefully outlined. The observers had been specifically trained in the method. Appropriate tests of the data were made. Forms are reproducible. Samples are small.

The discussion about the parameter of cost indicates that Wolfe is knowledgeable about the "real" value of the service rendered. The approach made to placing a value on the classification of personnel and a specific task complex is the use of a scaling technique involving ranking by judges. The problem of nursing quality was broadly explored. Some of the statements indicate that he is not highly knowledgeable about the many factors that are encompassed in the production of quality or how these should be examined. Individuals from whom he sought information, though status figures in the nursing field, are not scholarly practitioners.

This research makes a major contribution to the nurse staffing problem. The problem examined is a real one—how to combine levels of staff to best meet fluctuating workloads stabilized within limits.

A73. Wolfe, Harvey, and Breslin, Patricia. "Factors Affecting Quality of Nursing Care." Progress Report, (NU 00192-01A1), School of Engineering, School of Nursing, University of Pittsburgh, Pittsburgh, Pennsylvania, July 1968.

Review

Purpose.—This is the progress report of a project "to investigate the feasibility of utilizing a multifactor approach in measuring the quality of care." The authors review the various approaches that have been used: • estimate of quality, • emphasis on single factors, • audits, • measures of the patient's environment, and • some exploration utilizing the multifaceted concept.

Method.—The report covers their attempt to: • build a questionnaire, the initial set of factors that were obtained by mail from 155 respondents; • analyze the consistency of judges in ranking the quality of nursing care provided on 15 nursing units at a university hospital and that rendered in community hospitals; • build equipment and procedures for use of the videotape recorder; and • survey eight nursing units, making use of quality control worksheets, an elaboration of that described by Edgecumbe.

Results.—The report lacks closure since it is a progress report. They did find that of the many factors mentioned by at least five of the respondents in the initial survey, a working set of 10 factors could be generated. These were factors that grew out of three generations of classifications. The factors were given approximately the same weights by a set of head nurses, supervisors, and faculty members; however, the number in the weighting group was not specified. The intent was to submit these 10 factors to a sample of 500 nationwide practitioners.

It was found that head nurses, supervisors, and instructors in the medical center (34 responding out of 57) were highly consistent in their ranking of 15 nursing units on the quality of nursing care given.

The development of plans for the use of videotape recorder was briefly given. A major use of the recorder will be the check on time standards for performance of procedures.

The survey of the eight nursing units (four high and four low based on the rankings of the 15) using a tool following the ideas of Edgecumbe indicated, in the author's opinion, some relationship between quality on unit (as ranked) and items in the instrument. However, data were unavailable on many of the items and little confidence can be placed in the findings. For example, there was little evidence of stated objectives for the units. The quality of ward administration and building maintenance was much the same on all eight. The patients' charts showed considerable *nurse* variation but little difference among units. Only small differences were found among units on items of patient welfare and safety. Patients were generally satisfied with their rooms. The majority of patients in the sample cared for themselves, but there was some evidence that patients on the highest ranking ward received "more attention." The nursing care plans were either nonexistent in writing or poor in quality.

Critique

This progress report of a research effort is somewhat disorganized but it does convey the kinds of activities going on during the beginning stages of work. One cannot place confidence in the findings that the authors report since the findings are inconclusive. From the point of contributing to nurse staffing research knowledge, the questions raised by the report about problems of quality are excellent ones.

The authors stated "while it is appropriate to determine whether or not new procedures and approaches to patient care are justified on the basis of reduced cost and reduced time, it is, nevertheless, critical that quality of care be maintained." The value of the study lies in its description of the development of instruments relative to measurement of quality. The questions it raises about the ability of tools used by CASH in its quality control program to discriminate between nursing units providing low quality of care as against those providing high quality of care are very apt. Although the evidence presented by Wolfe and Breslin is inconclusive, it nevertheless raises serious questions about the validity and reliability of that tool.

A74. Wooden, Howard E. "Hospital Culture, The Nurse and Patient Care." Final Report to the Division of Nursing, Public Health Service, U.S. Department of Health, Education, and Welfare (NU 00035 formerly GN 7721), 1965. (Mimeographed).

Review

Purpose.—To investigate the effects on patient care brought about by a manipulation of the organizational structure of a medical nursing ward.

The two phases of this project included: (a) the educational preparation of personnel for organizational change and (b) an organizational restructuring phase in which certain selected environmental controls could be relaxed.

A change in administration and the transfer of the floor supervision necessitated the limitations of the project to the educational phase. Therefore, the possibility existed to demonstrate that attitudes and behaviors of nursing personnel can change without the introduction of organizational change itself.

Study design.—This is a controlled experimental study following the classic before and after research design utilizing one experimental group and one control group.

Hypothesis.—An educational program focusing on the creation of an interactive work setting for nursing personnel would be conducive both to comprehensive care and to personnel growth.

Study site.—The entire medical floor at St. Mary's Hospital, Evansville, Indiana. The control unit and experimental unit were of the same design except that the control unit was split between two separate floors. The control and experimental population were balanced in the following respects: • long-term medical patients as well as patients in various other categories, • staffing patterns, • medical staff, • physical design and available facilities, • patient loads and the patient stay averages, • pre-experimental observations showed the same results, and • patients on neither unit were informed unless they were interviewed.

Two nonparticipant observers, employed full time, alternated between the two units in specified time intervals.

Educational program.—Objectives of the educational program were to: • assist experimental personnel to develop a concept of the hospital as a social institution; • establish rapport and promote effective communications, understanding, and empathy among personnel and between patients and personnel; • assist the learner to become ego-involved in the ongoing situation; and • provide a basis for deeper insights into human behavior that would bring about behavioral change.

The educational program developed over the course of a long-term trial period. Once the general principles and group techniques were selected, an experimental application of these principles to a small group within the hospital was done. For 39 weeks, specific learning devices were attempted and the results evaluated. Based on systematic observation and on interviews of the participants (research staff, one physician, two supervisors, two staff nurses, the hospital admitting officer, and the personnel director) certain general results were achieved such as internalization of concepts, advancement of the concept of *process*, development of a broader understanding of the concept of communication, and organization of ideas.

Based on these results, a framework for building a short-term training program for the experimental unit personnel was developed. To break down defenses, reduce threat, and win support, preparatory meetings were held with experimental personnel over an 8-week period. These meetings were devoted to an explanation of why the program was offered and what the personnel might expect. All personnel were then tested on several standard psychological scales. The educational program was offered in 35 separate units of instruction over a period of 11 months. The themes for theoretical discussion and practical analysis of specific incidents involving patient and personnel behaviors were: communication theory, conflict situations and problem solving, stimulus-response mechanisms and behavior, learning theory perception, empathy, environment, and behavior, social system and role theory, maturity, motivation and social perception, leadership, social action, creativity, change and decision making sociograms, and the analysis of interaction and conflict, role playing, and self development.

Procedure.—Six separate sessions focusing upon the same material were offered each week to enable personnel to attend during their working hours. Attendance was optional. Group techniques were used and some attention was given to the nondirective concepts applied from Rogers. The participants prepared an anonymous list of problem situations experienced in the course of executing their respective roles. Elementary communication theory was presented and informal discussion of the identified problems followed. The general tone set by the group, the informal seating arrangement, optional attendance, permitting coffee and smoking, and group identified problems seemed to stimulate self-expression. Other aspects of the instructional programs as a basis for analyzing the environment were periodic assignments to observe frequency of types of situations discussed in class and role playing when appropriate.

Prior to the opening of the educational program, a special series of subject oriented classes with nurse aides and unit secretaries was conducted by the supervisors with assistance from the research staff, dietary and physical medicine departments. The content included elementary information on the anatomy and physiology of the brain and cardiovascular system, disease entities, diets, and physical therapy nursing. Slides, films, model, and demonstrations were used. This program was held with aides and unit secretaries on the experimental floor.

The three sets of criterion variables were attitudes and perceptions, behaviors, and information recall. Attitudes and perceptions include the nurse's conception of status functions, nurse's perception of others, understanding of nurses' problems, mutual agreement among nursing personnel regarding the patients' recovery progress, and level of agreement among nursing personnel regarding the patients' response to environmental expectations. General observations, recorded in field diaries, were made throughout the project. The four major behavioral indices studied were personnel domain and behavioral congregations, patterns of visits made to patient rooms, potential interaction situations as reported through interviews, and continuity of care in personnel assignment schedules. Personnel were also tested in regard to factual information recall in relation to individual patients.

Analysis of data and results.—*Attendance:* The attendance record of the five status groups is presented. The percentage in each category is high from the first through fifth meetings. The attendance dropped significantly from the sixth to 11th meeting. The attendance from the 12th to final meeting remained at an unexpectedly high level. Attendance was optional and at no time were the members approached regarding their failure to attend. Midway during the educational series, several of the nonprofessional personnel on the experimental unit, who had been employed for a period of over 3 years, resigned. It appears that these resignations were the outcome of built-up frustrations over a felt inability to solve newly identified problems in the work situation. The turnover rate for the experimental unit was lower than on the control unit by the end of the study. The turnover rate for nonprofessionals remained lower on the experimental unit than on the control unit.

Attitudinal Changes. Attitudinal change was reflected in the manner in which personnel became progressively active in their participation in the educational program itself. There was an increased tendency to raise questions and to express the self at meetings. The ability to formulate problems increased. There was an increased ability to acknowledge self-deficiencies. The willingness to voice uncertainties about many traditional patterns was expressed in the group. There was an increased tendency to analyze situations using the patient as the criterion of performance. Many participants discovered that conventional behavior is to some extent the product of having learned what not to do. There existed a steady tendency to be less complacent. From summaries of meetings and accounts of field diaries, there are numerous illustrations of the change in outlook on the part of experimental personnel.

The nature of conventional attitudes of nursing personnel and the impact of change is reflected in the study of nurses' conception of status functions and nurses' perception of others' understanding of nursing problems.

To gain knowledge of the nurse's conception of her status function, the investigators requested respondents to indicate in writing the three nurse activities that they personally regarded most important in fulfilling their roles as professional nurses. The various responses were sorted according to nurse-patient interaction, patient-doctor interaction situation, nurse-doctor interaction, ward operational maintenance, patient routine, and miscellaneous. The number of responses in each of these activities was totalled for the pre- and post-experimental and pre- and post-control group. On the basis of these expressed attitudes, a task oriented point of view prevails among the untreated group. In the post-experimental group, a definite shift occurs in the direction of patient-centeredness when the dominant concern is interpersonal relationships and when the nurse sees herself more as a colleague of the physician and less as a maintainer of the hospital.

To test the nurses' perception of other's understanding of nursing problems, a simple ranking instrument was devised. Each of the nurses was asked to rank nine personnel categories in the order in which she considered the types of personnel who understood her and her problems as a nurse. In addition to the four groups in the experiment, the instrument was given to nurses in three distinctly different geographic centers. The responses from 64 outside nurses were pooled to form a composite rating. Concordance among these rankings was extremely high. The response distributions proved to be discrete on statistical analysis (Mann's Whitney re-Test), except for the position of physician and administrator. Only the rankings from the composite group and the post-education group on the experimental unit were analyzed.

Standardized tests were administered to experimental and control personnel, once pre-experimentally and, on two occasions, post-experimentally. These tests were the Purdue-Non-Language, the Adaptability, the Leadership Opinion Questionnaire, and the Interpersonal Values. These measures did not on any occasion differentiate at statistically significant levels between experimental and control groups.

Behavioral Changes. An effort was made to determine if changes in the concentration of nursing employee activity in the patient domain would occur. The two areas selected for investigation were the geographical domain of behavioral congregations and the duration and proportional frequency of visits by nursing personnel to patients' rooms. A sequential sampling process was used for collecting data by direct counting techniques.

The procedure for data collecting consisted of making hourly counts of all nursing personnel congregated at the nursing stations at the moment of counting. Counts were made hourly from 9 a.m. to 4 p.m. for 5 consecutive weekdays. Samples were made simultaneously on both units by observer-counters who between sample periods alternated between two units. Three samples of 5-day duration were taken during the pre-experimental period and five samples after the experimental period. A summary of the statistical comparisons of the independent samples using the chi-square test of significance shows uniform pre-experimental samples. No significant differences are found in the control group before, during, or after the change variable was used. Behavioral congregations at the nursing station were significantly reduced after the introduction of the experimental variable. The task behavioral congregation counted 1 year after the experimental phase is not different from the pre-experimental sample taken on the experimental unit. Periodic surveys of lounges and work areas other than the nursing station gave the impression that no changes in the concentrations of personnel had occurred throughout the project.

An observer tabulated the visits made by nursing personnel to a selected sample of patient rooms in a given period of time. The number of rooms observed for each sample ranged from four to six private and semiprivate accommodations. The duration observation varied from 15 minutes to 1 hour from 8:30 a.m. to 4 p.m. The objective was to sample the proportion of professional nurses against nonprofessional visits. Four sample sets were taken during and after the experimental phase. A comparison between the first observation on the experimental floor and control reveals no significant difference. The proportion of nurse visits to nonprofessional visits is 1:2. In the second sample on the experimental floor, the proportion of nurse visits increases significantly. In the first experimental observation and the control sample, there are significantly fewer nurse visits that exceed 5 minutes duration. The number of nurse visits of less than 1 minute significantly decreased after the introduction of the experimental variable on the experimental unit.

To determine if the patient perceived opportunity to talk freely with nursing personnel and to whom he felt most free to talk, interviews were held with 126 patients. The interviews included an introductory explanation of the purpose of the interview and eight principal questions. All interviews were conducted by the same interviewer, and responses were recorded in the patient's presence. Results of the interviews ar summarized and statistical comparisons are made.

Patterns of Care Continuity. To analyze patterns of care continuity and staff work schedules, pertinent data were collected over a 43-day sample period during the pre-experimental phase on both units and for 41 days during the post-experimental phase. Statistical comparisons of both pre- and post-experimental data are summarized for the number of care units utilized and the potential for continuity of these care units. Care unit is a group of consecutive days during which care is furnished for a given patient by the same employee. Work schedules' potential for continuity of care is greater for the nonprofessional than for the professional, although for neither group are the daily patient assignments so structured as to utilize the potential. In eight instances VIPs were assigned the same nurse and the same aides for the entire period of their stay.

Factual Information Recall. The existing level of patient information recall and the extent to which that level may change in relation to the educational program were identified. Three assumptions underlie the necessity of measuring recall. An operational recall command seems essential to furnishing a reference for observing and interpreting patient behavior, facilitating crises decisions, and avoiding errors. The opportunity is present for associating facts with people. The extent to which personnel recall factual data is related to the employees' perceptions of the relevance of such data. A set of 27 informational factors was selected by an expert panel of five physicians and three nurses. All the factors pertain to physical care of special aspects of the patients' private life which have direct bearing on effective nursing care. Examples of these 27 items are sex, diagnosis, temperature, blood pressure, spouse's name, occupation, and mood today. The factors comprise four groups: items of which nursing personnel might gain knowledge through minimal nursing contact with the patient, factors that nursing personnel have repeated opportunities to learn, factors that may vary frequently, and factors that are recorded. This list is an extension of those used by the author in a previous study, *Aspects of Patient-Centered Care. A Final Report in Research Project W-44.*

The focus of the interview questionnaire was personnel knowledge of the long-term medical patient hospitalized at least 48 hours at the time of the interview. Interviews were usually held in early afternoon with head nurses, staff nurses, aides, licensed practical nurses, and unit secretaries.

The procedures followed in conducting the interview and the method of scoring are described. Raw scores, based on interviews held on both floors early in the overall experiment and later, are listed in four tables. The Ns, ranging from 14 to 26 for each group, represent the number of interviews, not distinct individual responses. A statistical analysis of data from two sets of interviews taken on the control floor and one set of the interviews on the experimental floor prior to the educational program shows no significant difference in scoring performance. The three samples were pooled; status categories and intercategory comparisons were made using the chi-square test of difference between frequencies distributed above and not above the mean of means for several combinations. The staff nurse performs at the highest mean level. Statistical comparison of the experimental group with the three other groups shows no significant change for the head nurse. A summary of performance sequence comparing the experimental sample is given. The nonprofessional category is the highest category for recall of nonclinical data. The score for the unit secretaries increased from the previous sample. Several broad conclusions are based on this data.

Consensus. The question of nursing personnel attitudes and perceptions is examined as to degree of agreement in evaluating nursing aspects of the patient's illness, an agreement as to the particular behaviors that nursing personnel would prefer the patient to manifest.

An instrument of different perception was designed to measure the level of agreement among personnel. Fifteen of the original 30 items were retained after the original purpose of studying patients' changing dependency patterns was changed to the study of differential perception. Professional and nonprofessional categories were the two groups interviewed. The interview guide consisted of 30 statements that could be answered as "never," "almost never," "sometimes," "almost always," and "always." Examples of statements are feeds self, bathes self, combs and/or brushes own hair, complains of pain, and seems spiritually motivated. Data are analyzed in detail.

Data for analyzing perceptions of the ideal patient were obtained through the use of a 34-item questionnaire. Six items were related to information flow, 11 items regarding service demand, and 17 items related to submissiveness. This instrument was developed and pretested in the author's Research Project HM 00044, USPHS, 1956–60. Analysis of the data from the three untreated samples shows that a highly normative pattern of preferred patient behavior is explicit in the opinions expressed by nursing personnel as a group. Under the influences of the experimental variable, the rigidly fixed attitudes become more relaxed, signifying a far higher degree of tolerance on the part of nursing personnel. Change is more frequent for the nurse and nonprofessional groups than for the head nurse. There is evidence of change in behavior as well. The author interprets this data as evidence of the phenomenon of self-discovery.

Conclusions.—In the course of the experimental program, nursing personnel as a whole demonstrate an increase in recall knowledge of their patients.

There is a higher level of agreement by personnel regarding aspects of the patient's state of illness and recovery, both physically and psychosocially.

There is an apparent relaxation in the attitudinal stereotype held by personnel as to what constitutes appropriate patient behavior.

The personnel behavior tends to focus more on actual patient contacts than on conventional task accomplishments, particularly for the staff nurse as evidenced by visiting patterns, behavioral congregations, and staffing assignments.

The actual point of departure for nursing behavior is the patient rather than tasks.

Central to all testimony was the belief by personnel that they had reached the point of being able to ask questions, to voice opinions, and to listen broadly. They had learned to accept others who were different and recognized each person as an individual.

The educational program included subject matter that supplied interest and understanding for personnel. Recognition of the experimental personnel was shown broadly and in depth. It encouraged responsibilities and supplied promises and challenge to personnel.

Critique

The field of nursing, having grown out of the military system, has imposed an excessive number of rules, restrictions, and attitudes upon the nurse that have in some degree impaired her ability to function freely and constructively in the work situation. This has ultimately affected her relationship with her patients, thereby limiting her effectiveness in the total care process. While these restrictions are seen to gradually disappear, there still exists in the hospital status hierarchy factors that influence the thinking and behavior in the therapeutic milieu. Because of the very nature of the situation in which the nurse functions where patient welfare is concerned, not all restrictions can be eliminated, though adjustments can be accomplished, allowing the nurse better utilization of her knowledge and skills.

Wooden attempts to assess and change attitudes, perceptions, behavior, and information recall of the nurse through educational means to improve her ability to function in the nurse-patient relationship. It was his desire to alter the organizational setting of the nurse, but a lack of cooperation limited his plan. Rationale for the study is sound. The theoretical framework of the study is well developed except for an appropriate literature review.

The experimental method is applied in the study before and after assessment of one experimental group and one control group. A variety of techniques are applied using observations, questionnaires, interviews, and the assessment of field degrees associated with casual observations. Development of tools is briefly described, though rationale for their uses are well outlined and samples of instruments are included. Raw data and data analysis or results are included in table form. Analysis of data is adequate and descriptions are included.

Criteria variables studied are (a) attitudes and perceptions; 1. nurses' concept of status function, 2. nurses' perception of others' understanding of nurses' problem, 3. the extent of mutual agreement among nursing personnel regarding the patients' recovery progress, and 4. level of agreement among nursing personnel regarding the patients' response to environmental expectations, (b) behavior; 1. personnel domain and behavioral congregations, 2. pattern of visits as they move to patients' rooms, 3. patient interaction situations as reported by patients through interviews, and 4. continuity of care in personnel assignment schedules, and (c) information recall in relation to individual patients.

An additional study is reported in *Family Centered Maternity Care*. A before and after study is used with the film *Hospital Maternity Care: Family Centered*. The Zucherman MAACL was used in the assessment of anxiety, depression, and hostility.

This is a large comprehensive study extending over a 4-year period. The extent in time and scope of the educational program is innovative. Samples used in assessment are large or adequate. Lack of information regarding tool development limits assessment of the study. It makes no direct contribution to nurse staffing design. The study provides us with a strong argument in favor of altering attitudes, conceptions, and behavior through education programs. This is not in itself a new concept but Wooden's approach is an interesting one.

A75. Wooden, Howard E. "Notes on Patient Personality and Hospital Organization: A Model in Dynamic Equilibrium." (NU-131), (no date). (Mimeographed).

Review

Wooden points out the need for a comprehensive explanation of hospital patient care, stating that it is fundamental to the furtherance and success of problem solving in the health profession. Basic elements involved are • the patient (a total person), • the hospital (a total social institution), and • the manner in which these two relate to each other.

The distinct care configurations are distinguished and disease-centered (emphasizing health as an end in itself), organization-centered (emphasizing operational efficiency), and person-centered (emphasizing health as a means to human efficiency as the ultimate end). These are described as "recognizable and defendable approaches to care."

Adopting a patient centered concept with the person taken as the reference for care programing, the individual is defined in terms of these premises: • the principle of individual differences, • an individual steadily undergoes change in time relative to his life experiences, and • an individual is integrated in a dynamically rather than statistically balanced framework that at all times allows both uniqueness and continuous transformation.

The socioaesthetic concept of dynamic equilibrium is presented in a model in the form of a mobile assemblage of the personality framework of the patient and the organizational framework of the hospital environment.

Stage I presents a model of the healthy dynamically integrated individual. Variants of the individual's customary total environment are social-cultural, external-physical, and internal-physical in nature. The aggregate personality is shown to be in balance with the environmental factors.

Stage II disease syndrome. When a mild nonthreatening disease is introduced, it does not necessarily change environmental, cultural, and physical variants in relation to each other but temporarily jars the system. With the intervention of the disease syndrome, balance between the aggregate personality and environmental factors is altered.

If the disease is biogenic, stress in the system originates, and treatment is focused only at the disease syndrome; or, if the disease is sociogenic, ethnogenic or ecogenic, curative measures will be only temporary unless counteracting forces are introduced in social, cultural, external-physical, or internal-physical environments. It is felt that the model demonstrates that illness is not an objective experience but involves other associations.

When a patient is hospitalized, a second set of environmental variables is added to his personality assemblage: the hospital setting, its social structure, relationships, and culture are shown in Stage III of the model. Milieu therapy is the use of the institutional variables; care modalities are applied in accord with the discoverable needs of the patient.

It is pointed out that the use of these factors does not directly nullify or reduce the stress in the relationships but serves as a set of secondary modalities in the care process by reducing the effect of the stresses produced by the illness and the new environment. Use of these variables could result in a state of balance somewhat equivalent to the state existing prior to the onset of the illness and hospitalization.

To attain a balanced state, individual patient's needs must be systematically considered in the therapeutic care process through promotion of communications and depth understanding of the patient's fears, likes, self concept, etc., in terms of his normal activities, normal associations, usual response to physical illness and psychosocial stress at home, his stress pattern in connection with his illness, and the related sociocultural changes. In designing a program of care, all of these factors must be taken into consideration and the best design determined by the ability of the patient to combat the changes, and by his wish and capacity to be dependent or independent.

In the postdismissal phase, the institutional milieu is gradually or completely removed depending on whether or not home care is provided. The ability of the patient to compensate on his own and reestablish a functionally equivalent dynamic state of balance will constitute a Criterion of Care performance in preparing the patient for independence and social competence.

Summary.—The personality structure of the patient is dynamic. In order to be effective the care process must also be dynamic. The total care milieu should be structured around the person rather than forcing the person to conform to the hospital environment. Relevant care needs must be acknowledged as changing and information about these needs must be sought since they are expressive of the total person rather than a fixed care type. Information devices are recommended for collecting, organizing, and implementing relevant information about the patient. A nursing analysis sheet, Supplement II-1, is included for obtaining personal information about the patient with a space for recording the implications of the recorded information. Supplement II-2 provides the format of a running record sheet for specific care plans, steps taken to accomplish the care, and a progress evaluation.

A therapeutic goal is the achievement of patient independence. Most significant factors are (a) the degree of self-dependence attained, and (b) the time required to develop this degree of self-dependence. Instrument 1 (included) presents a means of studying changes in dependence level; 30 indexes are included that indicate (a) critical points when patient first attempts then actually performs new activities or skills, or develops attitudes of self-confidence, and (b) length of the intervals between these crucial points. By comparing these points, a measure of the impact of the experimental environment on the patients' dependence can be obtained.

Hospital Care Summary and Resocialization Inventory Supplement III, Instrument 4, will be used during the postdismissal phase to determine such factors as family life adjustment, integration into community, occupational adjustment, patient satisfaction with his progress, and how well he can make his own decisions and manage his own physical needs. This information is correlated with other evaluative aspects of care. Attending physicians' progressional appraisals, immediate postadmission, midstay, and immediate pre-dismissal will constitute a correlate in the interpretation of all data collected and codified.

Critique

Since the evolution of the total patient care concept, considerable speculation has been formulated in regard to what total patient care is, what it encompasses, and how it can be accomplished. Wooden contributes an enlightening dissertation that contains relevant views fundamental to the concept of total patient care.

This is not a research study and cannot be evaluated as such, but is a treatise developed around the patient's personality structure and how it is affected by his illness and the hospital environment. Through the use of a mobile assemblage, Wooden demonstrates how the disease syndrome creates an imbalance in the dynamic equilibrium of the patient's personality. Further stresses placed on the patient by the hospital environment serve to create additional imbalance that the author feels can be nullified and the patient's personality equilibrium in part restored by meeting the patient's individual needs through a dynamic care process. Assessment of the patient's independence, the degree, and the time required to accomplish it, is recommended to determine the extent to which the therapeutic goals have been achieved.

The approach used in this dissertation is unusual in that it presents a psychosocial approach to the problem of meeting the patient's needs that is defined in specific terms. The patient's problems are defined, methods for coping with the problems are defined, and methods for assessing goals fulfillment are included. It provides justification for the philosophy that the hospital must adjust to the patient's needs rather than expecting the patient to adjust to the hospital environment.

This information should be useful to nursing administrators and educators and it provides a fertile area for research.

A76. Wooden, Howard E., and Smith, Dorothy M. *Care Programming and the Nursing Analysis.* Progress Report, Research Project (NU 00131), August 1965. (Mimeographed).

Review

This is a progress report on the development of a nursing history format to be used by the nurse in utilizing pertinent information about the patient in care planning and synchronizing both the care program and her own behavior to the patient's changing needs. Attention is given to a description of the care significance of each of the 22 items contained in the nursing history. There is evidence that the patient-nurse contact established during this interview process is significant in reducing stress and enables the nurse to obtain further information as the course of illness proceeds.

The development of the nursing history format passed through five major stages. The 22 items ultimately selected were based on 45 interviews. The present form has been used to interview 103 medical patients and 11 surgical patients. The average age of these 53 males and 61 females was 47.7 years. The subjects represented 19 States and 10 distinct religious denominations. Sixty-seven percent of the subjects reported taking tranquilizing medications within 2 weeks of hospital admission. The duration of the interviews was 27.5 minutes. A description of some of the forms and the complications for nursing care are presented in this report. The 20 case studies include the stages of the total process, i.e., specific plan of care, action stage, evaluation, and feedback following the patient from admission to dismissal. To test the hypothesis, 36 patients were tested on the Zukerman Multiple Affect Adjective Checklist scales using the "now" time set on a before-interview and after-interview basis. Each of the six nurse interviewers also administered the tests. Raw data from 20 subjects analyzed by the use of a sign test described reduction of depression and anxiety in the course of the interview but no significant change in hostility.

The 22 items that appears on the present format of the nursing analysis interview sheet are described. Each item includes the characteristic relevant to the individual patient and the deviation from the customary or normal for that patient. The purpose in describing these items is to illustrate how the nurse might utilize such information in structuring care. Many of the items include physical aspects of care that enable the nurse to assess the patient's coping resources, his positive and negative feelings, and his fears. By exploring these items, a picture of a person emerges that, if included in care programing, will reduce the gap between the sick role and the familiar social role and will furnish the backdrop against which the nurse and physician can treat the patient as a person. Experience has substituted the assumption that the interview reduces the patient's stress and creates a basis for further information needed during subsequent stages of the illness and care programing.

Description of the 22 items of the nursing history.

The length of continuous time in one place can indicate a measure of the patient's experience and adaptability. The location of the present home may indicate the distance from the familiar setting, the degree of strangeness and stress that the patient will experience. The geographic background may account for the patient's likes or dislikes such as dietary expectations. Knowledge of the patient's background may assist in the diagnosis of illness from a geographic focus. The patient will sometimes disclose evidence of his ability to adapt to a new setting.

Knowledge of how the patient arrived at the hospital, at the ward, and with whom, may indicate the degree of preparation and patient's arrangement of responsibilities. The nurse will have information of the psychophysical state that can be used to predict hospital behavior, and she will know who is or if there is a significant person the patient can lean on.

Information as to where the patient expects to go after dismissal will enable the nurse to express limits that must be incorporated into educational programing and will decide the extent of therapy to be completed in the hospital before dismissal.

When age is seen as a part of the broad configuration of the total person, it is a meaningful index of care and care programing. Age is a variable related to cultural factors and provides potential understanding of the patient's sense of personal usefulness.

The nurse must recognize the possible relation of illness to the patient's success or failure in identifying with his sex role model as well as his acceptance of the socioeconomic responsibilities implicit in his sex-determined role.

The patient's perception of disease and his acceptance or denial of illness may be related to ethnic grouping. Standards of expected conduct and acceptance may determine the patient's self-image. Food and ritual may be related to an ethnic group.

Because anxiety and tension are an increasing hazard in certain occupational groups, knowledge of the patient's occupation is important. An occupation may suggest the expected level of interpersonal relations. The patient's perception of the prestige of his own occupation in relation to his perception of the prestige of nursing may determine the sense of security the patient has in his relationships with the nurse.

Some general knowledge of the patient's financial status may be helpful in reducing stress, allaying fear, and assisting in the general adjustment to the illness. The nurse can gain insight into the source of possible distress and its relevance to physical signs and symptoms. Financial insecurity may interfere with important decisions regarding surgery. The nurse might aid the patient by providing information regarding helping agencies.

Knowledge of the patient's education is indispensable to nursing; it serves as a basis on which the nurse can assess the patient's ability to comprehend his care regimen. The patient's perception of his illness may be narrow and distorted, culminating in relapses in physical progress. Case study examples are provided. By knowing something about the patient's level of education, the nurse may better differentiate between the patient's overt expression of knowledge and deeper understanding.

Knowing the extent to which the patient can see and hear should enable the nurse to predict many of the patient's reactions to treatment procedures and the patient's readiness to participate in efforts to structure his own environment. It may be more pertinent for the nurse to know specifically if the patient cannot read so that she may make very definite adaptations in her relations with the patient.

Knowledge of the patient's religion and his philosophy of life is necessary for appropriate dying procedures and may be used for resources to accept or reject illness, pain, inconvenience, and possible death. His life philosophy embodies a host of cultural and psychological ingredients that exert direct and controlling influences on his behavior. The patient's religion must be incorporated into a care program structured for his individual and particular situation. Religious persuasion existing within a family may be a source of conflict in how the patient is allowed to live and to die. With or without formal religion, a person's philosophical point of view may reveal serious psychic limitations with implications for care and the relationship between the nurse and the patient.

The patient must be understood in terms of his family status, his role in the family unit, and his manner of participating in family activities for far reaching implications for management and treatment. Knowledge of marital status serves to designate a possible source of support or conflict strivings. The patient's role in the family must be considered in determining visiting hours, purchasing of gifts, decisions about autopsy, and the necessity of listening to conflicts with the significant person. The patient who experiences the greatest stress is the patient who concentrates most of his activity within the family group or who has a fixed routine of social activity. Household duties are a significant criterion on which to assess the level of normal self-sufficiency and self-dependency and the degree of probable change in these dimensions that might be impaired by the illness. The leisure activity category discloses much concerning the patient's dependency on family members and points up the supportive resources that are available within the family. Knowledge of the patient's hobbies is a source of additional data as to the dependency patterns. Information about involvement in community work may indicate an attempt to discover meaningfulness by belonging.

The primary concern in obtaining information about the physical condition of the patient should be relative to the symptoms manifested in the present state of illness. Knowledge of the patient's usual response to illness may disclose the difference in perception between the nurse and the patient in regard to current illness.

Information concerning the patient's normal routine is important as a basis on which the nurse can assess the impact of the hospital routine upon this patient. Within the limits of the disease entity and the patient's personal response to the disease, the nurse can determine how she might interview and affect adjustments.

If the patient is acutely ill upon admission, close observation and knowledge of the patient's responses will indicate the areas of explanation needed and the modification of procedures necessary to allay the patient's fears.

A case description is presented to demonstrate the use of the nursing analysis as a basis for learning and understanding the history of a patient, for predicting patient needs, for programing care, and for carrying out appropriate steps to meet those needs. The potential for transferring this information from one illness phase to another and from one patient to another is suggested. The nurse as a member of this research project staff conducted the admitting interviews and followed the various cases throughout the hospitalization period.

This project is included in the text of ***Hospital Culture and the Patient Care Process*** (Macmillan Co., 1966) by the principal investigator, Howard E. Wooden.

Critique

Nursing administrators and educators have devoted considerable time and effort to the realization of the total patient care concept. In spite of their efforts, few concrete, practical approaches have been developed and the emotional needs of the patient are dealt with on a superficial level.

In this progress report, Wooden and Smith present a nursing history form for obtaining information from the patient. These areas include origin, mode of admission, probable destination, age, sex, ethnic group, occupation, financial status, education, communication skills, religion, and/or philosophy of life, family status, role in the family, group of family activities, household duties, leisure activities, hobbies, community work, physical condition, history of response to illness, routines, patient's responses, and nursing and medical measures instituted. The significance of each category is discussed and its implications for nursing care described. From the information obtained the nurse is expected to build a plan of nursing care. However, this particular study is based on the hypothesis that the interviewer's relationship with the patient would be stress reducing to the patient. Undoubtedly this information and the interview situation could prove valuable to the nurse as well as to the patient, but techniques of interviewing and proper assessment of the information obtained would be necessary if the instrument is to prove totally effective. These aspects are dealt with superficially or are lacking in this report.

The survey method (interviews) was applied in the development of the instrument. This is just briefly described. The instrument was tested only for its stress reducing effects. Use of the Zucherman Multiple Affect Adjective Checklist scale on a before-and-after interview basis was used to assess depression, hostility, and anxiety. All other aspects of nursing care and nursing care quality assessment are ignored. The sample is adequate.

Insufficient information is provided in this report to adequately assess the design of this study. The method employed in determining the emotional needs of the patient is interesting but would require considerable education of nursing personnel in the use of the tool and in the analysis of the secured information to be effective. A study of the impact that the use of the tool would make on other aspects of nursing care and nursing care quality would prove interesting. One must also examine the use staff makes of the data. Is it incorporated in the care? And does it really make a difference on recovery and satisfaction? Or is it part of the myth of nursing practice? Nursing educators, administrators, and research personnel should find this report interesting and informative if only for the method provided for determining the emotional needs of the patients.

A77. Young, John P., and Eng. "A Method for Allocation of Nursing Personnel to Meet In-Patient Care Needs." (GN-5537), Operations Research Division, Johns Hopkins Hospital, Baltimore, Maryland, 1962.

Review

Purpose.—To determine the amount of direct care a patient actually received from nursing personnel of all types.

Sample: Ninety-six adult patients from medical, surgical, and opthalmological services were chosen with the assistance of nursing service to provide the full range of patients' conditions.

Instrument: An observer sat at the patient's bedside and recorded in detail all of the direct nursing care performed for 4 days. The data collected included kind of care given (bathing, feeding, medications, etc.) and by whom care was given (head nurse, general duty nurse, licensed practical nurse, nurse aide, etc.). No judgment was made as to the quality of care. Current practices were accepted as standard.

Results: During the period from 12 midnight to 6 a.m. patients received an average of less than 2 minutes of direct bedside care, regardless of condition. From 6 a.m. to 12 midnight, the amount of direct nursing care hours was highly dependent on the degree of illness of the patient.

Purpose.—To design a Direct Care Index.

Sample: Ninety-six patients were classified according to three patient care categories.

Instrument: With the cooperation of the nursing service, the primary factors indicative of patient's self-sufficiency or degree of illness were identified. These factors were grouped into combinations of factors to form three categories of patient care (self-care, partial care, and total) and are presented in this report.

Procedure: Frequency distribution of the amount of direct care provided for each of the 96 patients was determined.

Results: "On an average, it can be seen that Category I patients required .50 hours of direct care, Category II patients required 1.00 hours, and Category III patients required 2.50 hours." The distribution shows that the amount of direct care for self-care patients ranged from zero to 60 minutes from 6 a.m. to midnight. The variation for total care patients ranged from 50 minutes to 220 minutes.

Therefore, given the ability to classify patients into care categories, one is able to determine the total amount of direct care needed on a nursing unit, based on the average amount of direct care provided a patient in each category.

Purpose.—To show how direct requirements change with time on a typical medical ward.

Sample: Patients on a 29-bed medical unit were classified each day for 8 months.

Instrument: Daily hours of direct care required were determined by the Index ($I = .5N_1 + 1.0N_2 + 2.5N_3$ where N represents the number of patients in each category).

Results: It was found that the variation in nursing care hours was not the same as the variation in census. The index can be useful in predicting the nursing care load by adjusting to include the few patients that have been admitted or the patients that have changed conditions. The requirements for direct care were compared between four floors. The index is rarely high on two or more floors at the same time, suggesting that permanent staffing should be basic and unusual or increased care demands should be met by shifting supplementary personnel.

Purpose.—To determine the time required to perform various tasks on the unit in order to determine an effective means of allocating nursing effort.

Sample: All nursing personnel on four relatively homogeneous floors of the medical service were observed for a period of 2 months. The nursing service was typical and patients cared for were of the kind and degree usually encountered.

Instrument: Work sampling technique.

Procedure: With the cooperation of the nursing staff, nursing activities were divided into the following groups: direct care, indirect care, paperwork, communication, escorting and errands, cleanup, travel, nonproductive, and personal.

Results: The results show that 60 percent of direct care is provided between 9 a.m. and 12 a.m. Almost 80 percent is given between 8 a.m. and 6 p.m. The largest portion of direct care is furnished by auxiliary personnel. For a typical 29- to 30-bed nursing unit, the amount of time required for all activities other than direct care remained fairly constant at about 20 hours for an 8-hour shift. These results mean that a total productive activity consisted of a constant portion of 20 hours and the classification of patients on a nursing unit.

Purpose.—To determine a way to arrive at basic staff to satisfy the minimum demand and the assignment of additional staff on the basis of relative peaks in demand.

Procedure: The implementation of "Controlled Variable Staffing" is based on the index formula of classifying patients and productive activity computations based on work sampling. The Controlled Variable Staffing Procedure is implemented by initiating patient classification by the ward clerk. The charge nurse fills in the patient classification form concerning the patients' conditions. The nursing supervisor and/or the assistant director of nursing for each service determine the classification of each patient according to Category I, Category II, or Category III. The nursing supervisor uses this information to compute nursing requirements.

Because the computations are based on averages, the actual assignment of personnel to high load floors and removal of personnel from low load floors must be based on the experience and judgment of the nursing supervisor and on her familiarity with conditions existing on the floors.

Assignments and adjustments must be based on shortages and surpluses of at least 4 hours because the index does not distinguish the level of nursing effort. The nursing supervisor must decide whether a high index calls for general duty nurses, licensed practical nurses, or aides.

Results: It was found that the productive activity load has a minimum of 30 hours. "Four persons can deal with such a minimum, and a basic staff can be created of, say, a head nurse, a general duty nurse, or a licensed practical nurse as a team leader and a team of aides or orderlies." When additional people are required, such people can come from a pool composed of both professional nurses and auxiliary personnel to supplement the basic staff.

Critique

The need for an effective method of determining staffing needs has caused much concern for hospital and nursing administrators. The urgency of the problem has been compounded by the nursing shortage and increased hospital costs. Staffing needs based on the number of patients, though universally applied, provided nursing administrators with a false sense of security and were ultimately found to be inadequate. Many investigative efforts have been directed in this area, though none are found to be entirely satisfactory.

Based on the works of Conner, Young attempts to define a more precise method for nursing staff determination through the assessment of the amount of direct care, indirect care, and other nursing activities, expressing it in the more appropriate engineering term "workload". He admittedly does not attempt to assess quality of care. His rationale and approach are developed from an engineering orientation. This is less than desirable for he assumes that quality care is being provided and will continue to be provided with his recommended staffing methods. Patient and personnel satisfactions are not assessed before or after the assignment methods are instituted. These would be crucial to the success of the method. A literature review is not included though an appropriate bibliography appears at the back of the study.

The survey method is employed. Observer-recorder and work sampling techniques are used in the collection of data. Data collection is described in general terms. Specific information in regard to who did the observing, hours work sampling data were collected, etc., are not included.

Based on self-sufficiency, patients were placed in defined categories: self-care, partial care, and total care. Development of categories is not described. Direct care was studied by kind and duration and level of personnel providing the care. The data collection instrument was not described or included. Eight grossly defined categories were selected for categorizing nursing activities: • direct patient care, • indirect patient care, • paperwork, • communication, • escorting and errands, • cleanup, • travel, and • nonproductive and personal. Selection of categories was not described. Procedures for the use of the forms were well outlined.

It is impossible to evaluate this study for its research qualities due to the gross lack of information in regard to assessment techniques and instrument development and utilization. The investigator's recommendations for the use of staff pools and staff adjustment between wards leaves much to be desired for personnel satisfaction, and continuity of patient care is not considered. In spite of the deficiencies of this study, its methods for the determination of staffing needs is undoubtedly an improvement over the method using numbers of patients as its basis. Continued research in this area would be worthwhile.

B. Reports and Term Papers

B1. Abstracts of Efficiency Studies in Hospital Service. *Relieving Nurses of Non-Nursing Duties.* No. 136, London: Her Majesty's Stationery Office, 1970.

Review

Purpose.—A survey was undertaken by the Liverpool RHB O & M and Work Study team of the nonnursing duties being carried out by nurses in an acute general hospital of 184 beds. The purpose was to identify and quantify work that might be transferred.

Method.—The Region's standard coding list for nursing surveys, previous reports by the Boards O & M team, and Hospital O & M and Work Study Report No. 11 were used in the construction of a questionnaire. The summary of replies from ward sisters and sisters in charge of departments indicated areas of work involved. Continuous observation for 12 hours on two wards was maintained to indicate percentage of time spent on each extraneous activity. The observation showed that the highest level of errands was to the X-ray department. Continuous observation was carried out in the X-ray department for a 4-hour period.

Findings.—Twenty-seven errands totaling 117 minutes were undertaken by the nursing staff during a 12-hour period from a 28-bed male medical ward. This total was 21 errands and 80 minutes for the nursing staff from the female surgical ward. During one 15-minute period, one student nurse, one nursing auxiliary, one SEN, and one third-year student, from the same ward, visited the X-ray department. As a result, portering services were extended to relieve nurses of these nonnursing duties.

Critique

The problem of identifying and quantifying work that might be transferred to staff of other departments exists in many hospitals. This abstract briefly describes how it was done in one acute, small, general hospital in England.

The abstract does not include the rationale for the study or a copy of the questionnaire that was designed for data collection. However, it does include an example of a log used in the continuous observation of errands performed and an analysis of the visits in a 12-hour period. Therefore, the usefulness of this abstract resides in its suggestions for design of forms or tables.

B2. Abstracts of Efficiency Studies in Hospital Service. *Ward and Departmental Staffing Lists.* No. 138, London: Her Majesty's Stationery Office, 1970.

Review

Purpose.—During a study by the Oxford RHB O & M and Work Study Team at St. Crispin Hospital, the means of providing advance ward and departmental staffing lists were considered. The problem was to provide lists for more than 200 staff serving 32 wards.

Method.—Examination of the existing system controlled by the central nursing office showed that the lists for male staff were prepared weekly and those for female staff were produced monthly. A duty sheet, based on the male staff sheet, integrated the male and female wards changing the departmental staffing. Over 200 names were retyped each week when only 15 to 20 staff changed wards each week.

Results.—A pegboard with four movable panels was purchased. The use of the four panels provided advance notice of changes. The time for preparation of weekly duty lists was reduced to 15 minutes per week for chart upkeep.

Critique

The clerical problem of preparing assignment lists for staffing is real. This is a brief statement of the search for new clerical methods and procedures to provide advance staffing lists. The approach used to solve the problem was direct and simple. The system is feasible. The abstract is short but it provides an adequate description of the study and a figure showing the pegboard that was designed to facilitate the listings. The device proposed could be helpful to hospital staffing offices.

B3. Chaska, Norma. "An Approach to Cyclical Staffing." Unpublished Report, Rhode Island Hospital, Providence, Rhode Island, April 1970.

Review

Purpose.—To determine a methodology for cyclical staffing by means of classifying patients and determining minimum staffing requirements.

Hypotheses: (a) There are significant relationships between the three assistant nurse leaders and the assistant nurse leader in charge of the unit as to how each classified the same patient; and (b) there are significant relationships between patient classification and nursing staff requirements.

Sample.—Twenty-eight nursing wings at Rhode Island Hospital. (A general, nonprofit, 680-bed hospital.)

Instruments.—To determine staffing requirements, classification of patients was required. Three nursing leaders were picked at random from the nursing staff to verify the categorization. Nursing leaders from each of the 28 nursing wings were also asked to classify patients on their units. The largest wing had a census of 20 patients.

Data were collected during a 2-week period. Categorization of patients and a time study were completed on four units each day.

"A total of three samples of patient categorization was obtained from the total population of 28 wings during each of the day and evening tours of duty." Two of the samples were obtained from the assistant nurse leader during an evening and day shift. The third sample was obtained from the day and evening shifts for 2 weeks. One additional sample was obtained from 12 nursing wings in which data obtained before discussion of the categorization were compared with categorization done after the four assistant nurse leaders had discussed their categorization. One sample was also obtained on the night shift with only the assistant nurse leader on each unit doing the categorizing.

The forms designed to collect data from each unit required that each patient be assigned to Category I, II, or III. "Classification of patients in this study is a process of assigning a patient to one of three categories according to the acuity of his illness and the treatments and observation his condition requires." The assumption for the classification system of patients was based on "Criteria for Patient Classification According to Nursing Care Requirements and Personal Assignment" by Helen Dunn. (C13)

Three assistant nurse leaders determined the average amount of time required to care for a patient in each category by means of a time study. These nurses picked at random three patients from each category, calculated the amount of time it took to care for each patient, and identified the variables causing the variance. Eighteen Category I patients, 21 Category II patients, and nine Category III patients were used. The time study was completed each morning over a period of 2 weeks.

Procedure.—Categorization of patients was done on 28 nursing wings by the assistant nurse leader in each wing for the day and evening shift. The four assistant nurse leaders assigned each patient to one of three categories. The categorization of patients was compared before and after consultation by the investigator with the assistant nurse leader on the unit.

The three assistant nurse leaders studied the three categories and the kardex of each patient and visited each patient prior to assigning the patient to a category. It took about 5 minutes to categorize patients on each wing.

Three assistant nurse leaders picked three patients from each category and timed the length of time required to care for that patient during the morning. The form used in this time study included total time and a statement asking the nurse to identify "variables influencing the amount of time taken, such as; weight of patient, age of patient, loss of senses, mobility of patient, and patient teaching required."

"The Nursing Service Administration Committee designated the number of patients one member of the nursing staff may be assigned to care for in each of the three categories." This procedure is based on patient categorization and standards set by the Nursing Service Administration Committee.

The number of exceptions in personnel schedules was obtained by tabulating the special work requests. This number was compared with the original policy.

Findings.—There was a significant agreement concerning the categorization of the patient by the nursing leader on the unit and the three nursing leaders. The agreement for categorization was greater after consultation. Average amount of agreement of the four assistant nurse leaders was 68 percent before consulting and 81 percent after consulting with each other. "Fifty percent agreement or higher is considered significant. Seventy-five percent agreement is considered highly significant."

Patients in Category I require 30 minutes. Category III patients require 1 hour and 50 minutes. Nurses who care for Category III patients require assistance of auxiliary personnel. Variables identified by the three assistant nurse leaders are listed for each category of patient.

"Thus data obtained in this hospital insures the reliability and validity of patient classification."

Minimum full-time staffing requirements were based on the standards set by the Nursing Service Administration Committee. Findings indicate that ideal staffing would be one-third of each type of nursing staff on each shift with smaller ratios of aides on the night shift. The number of patients in each category was based on the average from samples of each wing.

Minimum part-time staffing requirements were calculated from the cyclical model and the minimum full-time staffing requirements were based on categorization of patients.

"A model for cyclical scheduling was developed for a selected floor. In comparing the present nursing staff to that which would be required by the model, great deficit of personnel is shown." This model was based on categorization of patients. The model indicates the type of personnel and the coverage needed to maintain minimum staff requirements. The model does not plot the schedule for any one person, but is a model to schedule all personnel. Variables in the model include every other weekend off for all personnel, no work period longer than a 4-day stretch, split days off as the alternate week of being off duty on the weekend, and the utilization of part-time staff to fill in the completed requirements of staff for 1 day.

Recommendations for implementing plans for cyclical scheduling are given.

Critique

A logical systematic approach is needed in the study of staffing requirements and ways of achieving it. Unfortunately, this study, though logical and remarkable in that it draws upon the work of others, is not tight in its design. The data are soft and weak. There is low agreement between raters who classify the patients into the three categories using two parameters: (a) acuity of illness, the treatments, and the observations and (b) the skill of the personnel required to meet the demands of the acuity of illness, the treatments, and the observations. Furthermore, weak defense is presented for the time calculations made of the care required of patients in each classification. The sampling is very small, the probability of error undoubtedly high, and the methodology for the time sampling is not described. The validity and reliability of the classification system for patients is not reported in the section dealing with its selection for use. Although standards had been set by the nursing service, the report included no elaboration of how these were determined.

Nevertheless, the study is very suggestive in that it touches upon many features involved in establishing staffing methodology. It is a pioneering piece of work attempting to relate care requirements, skill requirements, and standards.

B4. Christian, Marilyn Jeanne. "The Number and Types of Patients Requiring Intensive Care on Medical Patient Units in a Selected Federal Hospital." A paper submitted in partial fulfillment of course requirements for Nursing 477, DePaul University, Chicago, Illinois, 1962.

Review

Purpose.—To determine the number and kinds of patients in the medical area of this hospital who, in the judgment of the medical and professional nursing personnel assigned to this area, require intensive care.

Hypothesis.—There is a minimum daily census of 10 patients in the medical area at this hospital who meet the criteria for admission to an intensive care unit as established in this study.

Sample.—The survey was conducted on the five medical patient units in a 505-bed general medical and surgical Federal hospital in Chicago.

Instrument.—The content of the questionnaire is based on the criteria for classification according to nursing care requirements as established by Brooke Army Medical Center Hospital Management Research Unit. The classification utilized in *The Planning and Operation of An Intensive Care Unit,* Battle Creek, Michigan, W. K. Kellogg Foundation, 1961, was also incorporated.

The respondents are asked to indicate the name, room number and age of the patients on their unit who in their judgment require intensive care. Each patient should meet one or more of the criteria: (a) exhibits extreme symptoms—acutely ill; (b) behavior pattern is very marked; (c) activity must be rigidly controlled; (d) requires continuous treatment, observation and/or instruction. The following categories are to be applied to the selected patient, if appropriate: shock, hemorrhage, respiratory embarrassment, convulsions and/or coma, circulatory distress, complicated drainage problems, fluid and electrolyte problems.

The respondent was asked to indicate equipment and/or supplies required and any complex or unusual procedures, treatments or nursing care involved. Terminally ill patients were not to be included.

Procedure.—The first survey was distributed to 20 resident physicians, head nurses and general duty staff nurses assigned to the medical patient units, and was to be completed between 12 noon through 2 p.m. on a specified date. Seventeen questionnaires were returned.

The second survey, distributed 8 days later to 21 individuals, elicited 16 responses. Verbal responses through a second party were accepted for six cases.

Findings and results.—The age distribution of patients meeting criteria for intensive care ranged from 1 to 79 years. Nine patients from the first survey and 10 patients from the second survey were judged to meet the requirement for intensive care. Four of the patients were the same for both surveys. There was not complete agreement from the respondents. The resident physician is responsible for only one-half of the patients on each unit and may have selected from those patients. Seventeen of the 19 patients judged met the requirement of intensive care. The four patients that were selected as candidates from Survey One and Survey Two raise the questions concerning the existence of the intensive care unit to provide emergency, short-term type care. The most frequent classification of patients in terms of patient needs was hemorrhage and respiratory embarrassment. The treatments, procedures, nursing care, and equipment and supplies required in the care of patients chosen for intensive care indicate intensity rather than complexity of care.

Critique

This author tests the proposition that in a fairly large hospital, there are patients sufficiently ill to merit the attention of services provided in an intensive care unit. A fairly lengthy discourse is written about the purpose, objectives, elements, and development of intensive care units. The review of related research previously conducted is very brief.

The method employed is a questionnaire survey. The sampling is small (42 persons); it was taken on 2 days separated by 8 days. The author used the Brooke Army Medical Center classification of patient system but gave no rationale for its selection. She added to the classification scheme in order to enable greater reliability of data but failed to test the modification. Therefore, because of the limitations of sample size and sample days, as well as the questionable reliability and validity of the tools employed, the data on which the findings are based are questionable.

The value in the study lies in its providing testimony of how one hospital looked at the question of whether or not there were patients requiring intensive care. It suggests how one can survey patient populations and use existing writings on the subject. Its usefulness to a study of staffing methodology is restricted to its description of intensive care patients.

B5. Commission for Administrative Services in Hospitals, 3345 Wilshire Boulevard, Los Angeles, California. "A Study of Nursing Time Requirements for Patients of Various Age Groups, February 1966." (Mimeographed).

Review

Purpose.—To determine the relative difference in the daily nursing time requirements for the average medical, surgical patient under 65 years of age, and for the average medical, surgical patient 65 years of age or older.

To identify the elements of care that most significantly contribute to the difference in care requirements.

Sample.—This study was made by the cooperation and with participation of 18 Southern California hospitals of varying size and characteristics.

Eight hospitals were selected as sites in which nursing personnel would record certain care procedures that represented 30 percent of the average daily workload. The 433 time recordings represented 80 hours of nursing time.

In three selected hospitals, all nursing procedures for all patients for from 7 to 10 days were recorded. Fifteen additional hospitals were included to acquire an adequate sample for the classification of category mix for patients in each age group.

Instruments and procedure.—Time recordings of certain routine care procedures were made by nurses in the eight hospitals selected.

Nursing personnel recorded all nursing procedures for all patients in three hospitals studied. Nursing supervisors classified each patient according to degree of dependency based upon a patient classification system that was previously tested.

The classification of patients system is composed of three categories: Category I (Minimum Daily Time Requirements), Category II (Average Daily Time Requirements), and Category III (High Daily Time Requirements). Category I procedures include self-bathe, discharge, admission, etc. Ten procedures in Category II include assist to bathe, parental fluids—PRN, slight emotional needs, intermittent oxygen therapy, etc. Category III procedures include complete bed bath, extensive diagnostic studies, vital signs every 2 hours or more, isolation, etc.

Nursing Requirement Report is a list of nursing procedures. Those applicable to each patient are checked. The procedure for totaling the requirement for each patient is not included.

Total care standards per patient day were established for each category of patient for patients under 65 or 65 and over in three hospitals.

Staff Requirement Report was used at each nursing station in 15 hospitals. This report showed the total number of patients in each category.

Results.—The per diem cost of nursing care for the average short-term patient over 65 years of age is significantly greater than the per diem cost of nursing care for the average short-term patient under 65 years of age. The average length of stay for the patient over 65 is roughly twice as long.

Charts include the percent of 4,942 patient days in each age group. The patient mix during the study period was 68 percent under 65 years. The percentage of patients under 65 by service shows 46 percent, medical; 46 percent, surgical; and 8 percent, gynecological. Fifty percent, medical; 35 percent, surgical; and 15 percent, gynecological represent patients 65- and over. The percentage distribution of bed accommodations for each age group is presented. The average length of stay for each group is given. The number of patient days in each category of care is presented. Standard hours per patient day range from 3.54 in the 11 to 20 age group to 5.66 in the 81 and over age group.

The results of the study illustrate that the relative difference in the daily nursing time is 36.6 percent greater for the patient 65 and over.

Critique

The advent of Medicare has directed attention to the cost of care provided the elderly patient. Therefore, this study focuses on a significant question of staffing. Unfortunately, there is no theoretical framework for the research other than a brief reference to the impact of the legislation providing Medicare.

The time requirements of the procedures were derived from reports made by nurses themselves and from standard engineering techniques. Only eight segments of care were included in the self reports and the number of observations were small for each segment of care. The statistical treatment of these data was very limited.

The measurement of the 89 procedures, of which 26 were considered basic and constant and 63 varied depending upon special requirements, was not described except in very general terms. The sample of observations upon which the standard time is based is not included in the report. Neither were the statement of the nursing procedure and its description, the methodological protocol, the selection and training of the observers, and the tests for reliability.

Evidence is presented that the patients differed in age, in length of stay, and in clinical grouping. The classification of patients into categories according to their degree of dependency was based upon a patient classification system used previously, but no reference is made to the reliability and validity of the classification system.

The findings of the report, therefore, are questionable, since the written report does not present sufficient evidence that the data are reliable and valid. Whether this, in fact, is true or not is unknown. It may be that this interpretation is the result of poor and inadequate reporting of the methodology and all it entails.

B6. Commission for Administrative Services in Hospitals, 3345 Wilshire Boulevard, Los Angeles, California. *Nursing Floor Layout Study*, Phase II Report, May 3, 1967.

Review

Purpose.—To gather factual information regarding the effects of nursing floor layout on the effective utilization of physicians' time in serving patients. The following factors were studied: • physicians' on unit travel time; • nursing staff response time to physicians' on unit requests; • nursing staff response time to physicians' off unit requests; • miscellaneous considerations including location of physicians for communication, interference between physicians and other "agents," nursing station congestion, nursing unit noise level and nursing unit traffic control; and • nursing staff response time to patients' calls.

Methodology.—In order to predict each physician on unit travel time and thus his predicted travel time for both a centralized and decentralized layout, anticipated visits to each patient for a 7-day period were documented on a scale drawing of the floor layout. Predicted average time difference for the centralized versus decentralized floor layouts is presented. (The method of computing the predicted decentralized travel distance is not presented in this report.)

To determine response time differences to physicians on unit requests, the response time difference in terms of the differences in time that nurses are available to make responses under the two floor layout situations is examined. Phase I of this study showed that the equivalent of 2.8 percent total personnel hours were used in travel time to central care areas. (The method of arriving at 2.8 percent is not included in this report, but requirements are presented in Phase I report.) Therefore, decentralization would provide 2.8 percent of current available nursing time to be available for physicians request.

Nursing staff response to physicians' off unit requests was determined from a 4-day continuous study of telephone calls. (Sample size or method of classifying calls is not included in this report.) So few calls required a response by a member of the nursing staff that no further investigation was made.

Miscellaneous considerations are presented in an essay type report. Logic is applied rather than detailed study.

A sample of the Nurse Call Survey used to document the data concerning nursing response to patient calls is presented. The information gained in one 72-hour sample was analyzed in terms of number and percent of patient calls by work shift, number and percent of calls by hour of day, the time taken to answer patient calls, number and percent patient needs that were fulfilled according to the nursing observer's satisfaction within a certain time span, number and percent of patient calls according to a general reason for the call, and the average time taken to fulfill patient needs to nursing observer's satisfaction. (Definition of nursing observers is not included in this report.)

Findings.—The increase in physician travel hours that can be expected through decentralization of nursing stations is tantamount to removing one-half full-time physician from service based on the expected percent increase in physician travel time with decentralization. The predicted physician travel patterns upon which the travel time difference was computed presume that the physician knows what nursing unit of the hospital his patient is on.

The physician is known to be on the floor by three times more personnel at a centralized nurses' station than at a decentralized station, thus reducing the number of calls to the floor to determine if the physician is there.

It is probable that decentralization will cause interference and delay between agents attempting to serve a common patient.

Unless the portion of the decentralized nursing station used by the physician is constructed to a size more than one-third of the equivalent area of the centralized station, it is theoretically possible that congestion could be increased.

It is logical to believe that many activities necessarily performed at decentralized nurses' stations will increase the overall noise level on the patient wings.

It seems that the centralized plan provided the better control of traffic but the existing traffic control system is not an inseparable product of the existing floor layout. It is possible to retain centralized traffic control with a decentralized nursing unit layout.

In nearly all cases, more than 10 minutes were required to fulfill a patient's need for pain medication. Two cases were isolated where the time to fulfill the patient's need seemed unreasonable based on applied judgment.

Critique

The decision to decentralize a nursing unit station into smaller units or to reorganize several smaller units into a larger one has implications for nursing and medical staff. This pamphlet describes an attempt in one hospital to obtain factual data about the effect of decentralization and to apply logic in arriving at a conclusion of what should be done.

The writing reflects a problemistic search in a particular setting. The methodology is very loose and there are no supporting data to explain how certain predictions of time were calculated.

The tools and their application are not well described. No evidence is presented to support the reliability or validity of the data. The reporting is so poorly done that the content of the booklet is confusing and lacking in meaning.

B7. Commission for Administrative Services in Hospitals, 3345 Wilshire Boulevard, Los Angeles, California. *Nursing Requirement Studies, Intensive Surgery Unit, Intensive Medicine Unit.* January-February 1968.

Review

Purpose.—To determine the hour by hour individual staffing requirements of the intensive surgery unit and the intensive medicine unit.

Methodology.—The department manager, nursing administration and the CASH consultant developed a comprehensive list of activities common for all patients and for which an average frequency could be predetermined.

Forms for each shift were developed by CASH. On these, unit nursing personnel recorded the number of activities performed for each patient and the hour when it was performed.

Time standards for specific activities were determined by unit personnel recording actual time spent on activity. Nursing administration studies of activities and CASH time standards were used whenever possible.

Department managers reviewed each day's Nursing Requirement Reports before submitting them to nursing administration. Nursing administration summarized all individual Nursing Requirement Reports and provided the CASH Consultant with daily census data.

Studies were conducted over a period of 10 continuous days.

For the intensive surgery unit, the operating hours per patient day standard is 14.46. (The basis for this standard is not given in this report.) The personnel performance ratios to this standard during the study period were 100.5 percent. ("Personnel performance" is neither defined or explained in this report.)

For the intensive medical unit, the hours per patient day is 5.170. The personnel performance ratios to this standard during the study period were 73.4 percent.

Findings.—*The Intensive Surgical Unit.* The most time consuming activities are presented for each shift and reveal that over 50 percent of the workload on any shift was attributable to 12 of 14 total activities. A table listing the 14 most time consuming activities shows the standard hours required by each shift.

The Work Distribution chart is presented and shows the fluctuation of nursing activities at different hours.

The Intensive Medical Unit. An analysis of the most time consuming activities reveals that over 50 percent of the workload was attributable to eight of 12 total activities. Standard hours required by shift are given. The work distribution chart shows that there is great fluctuation in hour by hour workload.

No allowance is made in applying standard times to caring for patients 65 and over.

Critique

The problem of the amount of time required in the care of different patient populations in a hospital is a pertinent one, since these requirements do affect the amount and kind of staff provided. This writing pictures an attempt to determine how much care is needed by surgical and medical patients who are intensively ill.

There is no reference to previous studies of staffing. Neither is there any review of what constitutes the intensively ill patient and his requirements for care, the complexity of it, and the parameters to be considered in planning for it. Indirectly, the author defines this care through a listing of 99 activities, primarily technical in nature. These activities are not described, either in terms of knowledge or the skill base underlying each activity, or by a simple definition arrived at by describing the procedure involved in the task.

The data are presented in amounts of time derived from multiplication of frequency of tasks and time required for task performance. A simple ranking of activities requiring the most time on each shift was given. Charts were used to depict work distribution.

No basis is given for time standard development, for the determination of personnel ratios, or for the hours per patient standards. No analysis of skill level requirement is included.

Because the methodology is poorly and inadequately described and much is lacking in the report, one hesitates to put confidence in the results reported. The methodology appears to be standard work study methodology from industry; however, the report cannot be interpreted fully without additional information from the writers.

B8. Commission for Administrative Services in Hospitals, 3345 Wilshire Boulevard, Los Angeles, California. *Pilot Labor Cost Study.* Appendix II, May 1966.

Review

Purpose.—To verify the results of previous research relative to nursing time requirements for medical-surgical patients under 65 years of age and 65 years and older.

To determine the differences in the characteristics or patterns of care for the same age group.

To develop the format for similar studies.

Procedure.—Work sampling was used. The total number of observations, days, and rounds required was based on the Preliminary Information Record and the Table of Random Times. Study observations continued for a 7-day period. The number of observations recorded was 3,048. Observers were selected for each shift from the student nursing staff. All activities were recorded in the Nursing Activity Sampling Record. Each day's studies were forwarded to the CASH office for analysis.

A Work Sampling Control Chart, Verification of Random Patient Day Sampling, and Calculation of Precision of Results are exhibits included in this report.

The Preliminary Information Record includes the number of units to be sampled in relation to the hospital bed size and the nursing unit bed size. A method of using preliminary estimate of total observation, total days, and sampling rounds per shift is presented.

The Work Sampling Alignment Chart concerns the element to be measured, precision interval accuracy, and number of observations. Interpretation of this chart is brief.

The Nursing Activity Sampling Record is a form for recording patient's age, sex, and diagnosis. The time of observation is listed.

Sixteen direct and indirect patient activities and employee activities are coded. Among eight direct patient activities are such activities as: bath, medication, rounds, and treatments. Charting and patient servicing are included in the four indirect patient activities. Employee activities include delay, meals, and personal. Examples of each of the activities are given.

The results of the study are summarized according to number of patient days, patient days distribution, number of observations, time distribution, hours allocated, and hours per patient day. The percent of variance is 29.5 percent for patients 65 years and older. (Procedure for calculation is not present.) Documentation of the validity is illustrated in three exhibits. The Work Sampling Control Chart is a formula of control limits. Length of stay was calculated by dividing patient days by number of discharges. The figures were within normal range to show verification of Random Patient Day Sampling. The third exhibit is a formula representing the Calculation of Precision of Results.

Critique

The cost of care presented by patients of different age groups is a question of timely importance. This effort is titled a pilot study and was undertaken to examine the question of cost. The authors state that this pilot study was carried on to verify previous research but they fail to specify which ones.

The analysis of the medical-surgical nursing requirements, expressed in time, was made upon a patient population cared for by the staffs assigned to two nursing units. As the proportion of older patients, those over 65 years of age, increased, the amount of nursing staff hours increased. Likewise, as the proportion decreased on the other unit, the amount of nursing staff hours decreased. Unfortunately, the authors fail to indicate what mechanisms determined that a change in nursing hours should occur. Was it subjective evidence of lowered quality of care? Was it omissions of care? Was it staff morale? They provide no explanation of the decision to make changes in hours provided. The design of the experiment is very loose. There are no controls of confounding variables, no definitions, and no standard data collection.

Statistical data are collected about the use of other items by the two age classes of patients. The same patient population is not used as that for the nursing study. In fact, there is no evidence that the population was held constant in any period of the data collection; neither was there evidence that the sampling was random. Evidence concerning the accuracy of the counting of items in lacking.

The initial idea of studying two populations on each nursing unit could have been enlarged to study the impact of assigning or withdrawing older patients to these units. The same population could have generated the complete set of requirements studied. This was not done. Therefore, one does not know what kinds of bias were introduced into the sampling procedure.

Innovative features of the study are found in the attempt to determine support provided a particular group of patients by supporting services and the cost of care provided by other departments.

Other than suggestions for areas of study to other investigators, the value of this study is limited.

B9. Commission for Administrative Services in Hospitals, 3345 Wilshire Boulevard, Los Angeles, California. *Pilot Nursing Study.* November 1, 1966.

Review

Purpose.—To determine the relative difference in the applied nursing time requirements for medical and surgical patients under 65 years and patients 65 and over.

To test the AHA's methodology.

Instruments and procedure.—Work sampling was conducted. The total number of observation days and rounds required was based on the Preliminary Information Record. The observations were continued for a 10-day period and included 5,237 direct observations.

Observers for each shift were selected from the nursing staff. Observations made in accordance with a table of random times were recorded on the nursing activity sampling record. Ward clerks were oriented to the task of recording pertinent patient information. The CASH office analyzed the Nursing Activity Sampling Records and the Patient Information Records.

Samples of the Preliminary Information Record, Work Sampling Alignment Chart, Nursing Activity Sampling Record, and Nursing Activity Summary Record are included in this report. The Preliminary Information Record includes the number of units to be sampled based on the hospital bed size and nursing unit bed size, and the preliminary estimate alignment chart presents three number scales representing elements to be measured, precision interval, and number of observations. The Nursing Activity Sampling Record is used to record the time of observations, the bed number, code for staff and a nursing activities code list. This list of 16 activities includes medications, vital signs, supportive care, rounds and patient servicing, etc. The Patient Information Records list age, sex, day of stay, time of transfer, part of day, and type of admission. The CASH statistical staff matched the Nursing Activity Sampling Record with the Patient Information Record. Variations in each unit were developed. Calculation of precision of results is presented in a formula representing number of observations, percent observations of the critical condition, and tolerance.

Results.—The Summary Record includes data from the following: differentiation for under age 65 and age 65 and over for total elapsed patient hours, number of patients divided by eight, number of assigned observations, percent of assigned observations, staff hours, and hours per patient per day. From these data, a variance and total number of unassigned patient observations are given for each ward studied.

Critique

This small pilot study was conducted primarily to test methodology for a larger study. Estimates were made of the total observations required to obtain a sample which would reach within the 5 percent precision requirements. Unfortunately, the report contains only brief written comments of explanation. The statistical calculations are clear from the tables, charts, and records. There is no information about the selection, training, or testing of the observers for agreement. Neither is there a reference to the selection of the Nursing Activity Sampling Methodology or from what source it is drawn.

In essence the publication is a set of exhibits. To understand the exhibits, one really needs the background of the study by Jacobs "American Hospital Association Nursing Activity Study." With the knowledge of that study, the reader can then envision where this pilot study fits into the scheme of the larger study.

B10. Crane, Keith H. "Nursing Service Staffing and Scheduling." No. 5-64. Ann Arbor, Michigan: Community Systems Foundation, (no date).

Review

Purpose.—A program to study how to determine true unit staffing requirements and how to schedule these requirements easily and equitably.

Methods.—*Basic to determining staffing requirements:*

All activities on a nursing unit identified by personnel category and performance of them relative to an index of patient conditions were measured. It seemed necessary to measure the care rendered on a desirable quality level. "Nurse competence was assumed to be adequate since Blodgett is an accredited teaching hospital and has a strong inservice program." The question of adequate care time must reflect hospital goals of providing sufficient technical care and providing sufficient personal attention to affect recovery.

"Since this study revealed that 79 percent of direct care rendered was in basic nursing, it is assumed that all technical care required was given. Also, since the unit was heavily staffed (daily average of nursing personnel was 19.6 versus 18 approved positions for a 71-bed unit), it is assumed that adequate personal attention was given."

In order to measure all nursing activities on a unit and then determine what personnel categories should have performed these activities, a work sample was obtained and analyzed. "The appropriate personnel level for each activity was determined by the observer at the time the activity was noted." The hospital's nursing job specifications were used as a guide in setting "leveling activities," by considering the nature of the activity and the condition of the patient as specified by a "patient profile."

"Every patient was profiled, or ranked, into five classifications of care required for both nursing and technical nurse." These profiles were used to determine level activities and to establish the exact amount of direct care required by each classification of patient in the profile. The five classifications on patients ranged from "patient capable and willing to perform his own care or treatments" to "patient requires complex or intensive care and manifests extreme symptoms."

From the work sample observations, a list of all different floor activities was compiled by nursing category and shift. The number of hours the average employee spends at various activities was noted as well as the amount of time each category of personnel was functioning at each level.

"By recording the patient's name when direct activities were noted during the work sample, it was possible to relate direct care time to the patient's profile and thereby assign a time value for basic and technical care by nursing category (level) to each profile classification."

"Care activities were also grouped on the basis of staffing levels during the study." Unit care index groups were plotted with average census for these groups.

Nursing activities were divided into direct care, indirect care, and unit activities so that the relationship between activities and patient needs (profile) could be determined.

Basic to scheduling nursing personnel:

The techniques of cyclical scheduling pattern were used to alleviate the problem of scheduling hours. The technique used was a cyclical scheduling pattern of working days and days off, that repeats after a 7-week cycle. One pattern is used for nearly all employees. Every five nursing positions were covered by seven scheduled positions to assure identical coverage each day of the week. Job availability is achieved by providing the proper proportion of straight and rotating shifts to suit individual requirements and allowing personnel to trade working days and shifts among themselves. "A cyclical schedule was designed for one unit (71 bed capacity) that was staffed by 36 full-time and many part-time employees." It was necessary to experiment to determine the optimum distribution of days off and the number and manner of rotations. "A critique, by the unit staff, was the means used to evaluate these experiments."

"Two different schedule patterns were tried on the test unit." The first pattern provided 3-day weekends and two shift rotations. The second pattern reduced the length of the work stretch and increased the rotation to three shifts. Personnel who did not like doubling back (working a day shift after an evening shift or night shift) or working an evening shift or night shift before a day off could change their rotations with supervisory approval. Three-day weekends were eliminated from the pattern.

Findings.—It was observed that registered nurse direct care time is primarily in making rounds and passing medications. The bulk of the day is spent on indirect activities. The student gives the most direct care but the nonprofessional employees (as a group) spent the most time with patients. Registered nurses and students are consistently low on the expected 1 hour of idleness per day while the nonprofessional employees take twice as much idle time. The nurse's aide spent a significant amount of time on activities "above" her level. Much of the head nurse's activity (for example, 2¼ hours of record clerk level) was spent at levels "lower" than expected. A massive amount of direct care is given in a 2-hour period from 9 a.m. to 11 a.m. Peak direct care period is primarily basic nursing care (beds, baths and other a.m. care). The orderly did not spend too much observable idle time but spent a lot of time off the unit on errands.

The cyclical schedule has reduced supervising clerical time, although supervisory judgment is still used to assign individuals from a unit group schedule to individual units.

"Cyclical scheduling will reduce direct labor costs over other scheduling means because it does not rely on the skill (or lack of it) of 16 head nurses and it does require central scheduling of all part time as well as all overtime hours." There is also no provision for temporary help that so easily becomes permanent.

"Very little change in the present system is required to administer the schedule."

"To avoid gross overstaffing when students are on the unit each student should be considered as 25 percent practical nurse and 25 percent nurse aide when making up for deficiencies in full-time staff."

The schedule does rigidly define working patterns for all employees as a group but not necessarily for each individual.

Conclusions.—Units should be grouped into pairs to take advantage of workload leveling.

One unit group should be a "slack" unit to assure 100 percent occupancy the year around in all other units. "The slack unit should be staffed for 18 beds less than capacity."

"Recommended positions were derived from required positions by elimination of all partial jobs and passing the extra work responsibility to the next highest category."

Part-time help is used to fill vacancies and may fluctuate greatly depending on full time availability. It will no longer be practical to assign part-time employees to any one unit or guarantee a specified amount of work every week.

Part-time help will have to be procured and assigned a long as full-time coverage is below requirements.

"A separate cyclical schedule should be constructed for every unit group discussed under staffing requirements." The number of positions required for each group will be the recommended jobs in each nursing category, multiplied by 7/5, and rounded to the lowest whole number."

Clerical help should be placed on a cyclical schedule modified to a 4-week cycle.

Vacations should be given so that no two employees of the same nursing category are gone at the same time for the same unit. Holidays will require modifications by the head nurse.

Critique

The subject of nurse staffing and scheduling is a highly important one, requiring the application of logic and involving the systematic collection of pertinent data. This author, in spite of the limitations presented in the report of his work, suggests an approach elements of which merit attention. The concepts of level of work, patient profiles, and cyclical staffing are sound. It is regrettable that more attention was not given to specific features of reliability and validity in tool development and application. Furthermore, the quality of the writing itself is very poor, making interpretation of the contents extremely difficult.

Only one reference is made in the text to previous studies on staffing, that by Safford and Schlotfeldt, appearing in Nursing Research, 9, No. 3 (D360). There is no mention of any of the research studies on patient classification, work sampling, or other types of staffing methodologies.

Unfortunately, the data presented have been collected by tools and methods of questionable validity and reliability. There is no adequate explanation of the work sampling methodology and no reference to training and testing of observers. The patient classification system is briefly described, but not included is information about its construction, its reliability or validity. Population samples are omitted. The author provides staffing formulae and an index but makes no statement as to whether or not these are new or adapted from some other methodology.

Because of these limitations of the study and especially of the reporting, it is impossible to state that the conclusions are sound. The interpretations are very general and not placed in a framework of knowledge. The study served as the basis of another work of the author.

B11. Crane, Keith H., and MacLeod, Vernon. "Analysis of Nursing Personnel Utilization on Patient Care Units." No. 136-65. Ann Arbor, Michigan: Community Systems Foundation, December 1965.

Review

Purpose.—To develop a method for predicting the staffing requirements of the patient care units based upon the patient care needs of those units. The total staff consisting of the appropriate number of professional, nonprofessional, and clerical personnel required must be determined for a given number of patients with varying care needs.

The grade of nursing care was assumed adequate under all study conditions because this analysis is based on quantitative techniques. The measure of nursing unit effectiveness is the *quantity* of care rendered. Quantity of care rendered is the man-hours of "direct" patient care defined as the time spent in the presence of a patient regardless of the activity performed.

Hypothesis.—Direct patient care (quantity of care) rendered on a nursing unit is a nonlinear function of the patient care needs on the unit; the size and composition of unit staff; the unit management; the physical design of the unit; and the supplies, equipment, and services available to the unit.

Sample.—Four units at Pennock Hospital, Hastings, Michigan. The day and evening shifts were studied as separate analysis units. One of the floors was obstetrics, and patient census rather than patient profile was used to determine workload on that unit.

Instruments.—Patient profiling, work sampling, and multiple regression are analysis techniques used for this study. The patient profile is a subjective measure of patient care needs. Work sampling provides a measure of actual care given and measures the skill level requirement. The relationship between patient profile, staff size, and direct care rendered was determined by the multiple regression technique.

The patient profile analysis is a measure of patient care needs that can be correlated with a measure of unit performance. Subjective categorization of each patient was based on two criteria: personal (basic care) needs and treatment (technical care) needs. The charge nurse categorized each patient by one of four codes within each criteria daily at the start of each shift. The columns were totaled and then multiplied by four weighting factors for each criteria obtained from a similar study at Blodgett Memorial Hospital, Grand Rapids, Michigan. The personal care factors ranged from .5 to 2.4 on the day shift and .2 to .8 on the evening shift. The range of treatment factors was .2 to .8 on the day shift and .1 to .3 on the evening shift. Expectant mothers, mothers, and newborns could not be profiled according to this criteria so census was used as an indicator of patient care needs on the obstetrical unit.

The work sampling technique was used to furnish nursing activity time estimates under a variety of different unit conditions (data points). No attempt was made to study the 11 p.m. to 7:30 a.m. shift on any unit or to isolate either nursery or pediatrics. One thousand observations were taken per data point (different unit condition) to achieve an accuracy in time estimates between 0.6 and 3.0 percent (95 percent confidence level). Five thousand observations were taken per analysis unit, permitting five data points to be utilized in the subsequent regression analysis of each unit. Four thousand observations were taken on eight analysis units (two shifts of four nursing units). The various nursing activities that were to be measured were defined and assigned a code number. The criteria used to define activity codes were as follows: must encompass all possible nursing activities, must reflect the desired nursing personnel skill level either direct or previously defined in Nursing Unit Measure of Effectiveness, or indirect patient care as any activity being performed for a specific patient but not in the presence of that patient, or unit activity that includes all other activities such as personal and idle time. A list of observer instructions was prepared for skilled registered nurses who were familiar with all the units and personnel.

A nonlinear relationship exists between direct patient care and the unit variables of patient care needs, size and competence of staff, unit management, design, supplies, equipment, and services. This hypothesis was qualified by multiple regression analysis. The dependent analysis unit was direct patient care rendered in man-hours per shift. The independent variables consisted of patient profile indices per shift and staff size in man-hours per shift. Staff composition, unit management, design, supplies, and services were not included in the regression analysis. A linear multiple regression computer program was used for analysis. The actual regression equation components are given in the appendix of this report.

Results.—The work sample measurements of activities by type (direct care, indirect care, and unit) and by skill level (RN, LPN, etc.) were averaged for each analysis unit. The breakdowns include all float personnel time, supervision, orderly, and ward clerk time. The percentage of direct care on different floors varies as did the high average patient care need. The analysis units are consistent in the percentage of time spent on indirect care. A high percentage of unit activity in obstetrics is due to formula room activities. The average personnel skill requirements per shift by analysis unit is presented in a summary. The difference between total skills required and personnel hours observed shows that head nurse and licensed practical nurse skill requirements are exceeded by the supply of these personnel categories. Most of the excess head nurse and practical nurse time is devoted to nurse aide and ward clerk activities. The floor ward clerk is spending less than one-half time working for the nursing units, indicating an average daily lack of 7.5 man-hours of ward clerk skills.

Two solutions obtained from the regression equations for each unit were: (a) the computation of direct patient care at various staffing levels while holding the profile index constant; and (b) the computation of direct care at various profile index levels while holding staffing level constant. These solutions were plotted graphically showing interesting observations. Direct care rendered is more sensitive to staff size than profile index levels on one-half of the analysis units. Only on one unit was direct care more sensitive to profile index level than staffing level. There seems to be a peak amount of direct care, attributable to staff size on an analysis unit, except in obstetrics. The additional benefit, in terms of direct care hours, received from each additional man-hour of staffing is low on the evening analysis units relative to the day analysis units. Two floors have a similar relationship between direct care and staffing levels.

The assumption was made that the desirable amount of direct care per profile index number was the average observed in this study. Using this standard, a desirable daily unit staffing in personnel numbers is associated with a given profile index. Given the direct care hours and profile index, the total staffing hours can be obtained from the regression equation graphs of direct care versus staffing. Subtracting the expected float personnel hours from the total staffing hours gives the unit hours. This figure divided by 8½ hours per person gives the number of unit personnel required. Tables are presented that summarize this procedure.

Conclusions.—The recommended maximum daily unit staff and normal daily staff is compared for each of the four study floors for the day and evening shifts. Normal daily staffing, reflecting average rather than maximum staffing pattern, can be done by continued pattern profile and analysis. The remaining personnel, (after average staffing needs have been met) should be utilized as floats and placed daily where patient care needs are reflected by the high profile index.

A table contains the recommended percentage of each nursing skill required in each unit.

Another table contains the recommended maximum daily unit staff by skill level. The previous conclusion on staff size and composition was applied.

The amount of time spent by supervisors and orderly staffing seems appropriate but the ward clerk staffing is short by 7.5 man-hours daily, assuming that all the present ward clerk tasks are productive.

Critique

This is a report of an analysis of utilization of nursing personnel and builds upon previous work by the senior author carried out at Blodgett Memorial Hospital in Michigan. There is no recognition of existing research studies conducted on either utilization of nurses or on patient classification systems. The development of the activity analysis codes and work sampling technique is presented as new ideas rather than as modified or as drawing upon ideas of others.

The findings are based upon data collected and upon the application of the multiple regression analysis. However, there is no evidence that the tools used, either the patient profiles or the work sampling, produced reliable and valid data. There was no reference to observer training, testing for observer agreement, or assumptions upon which to base face validity. Assumptions were made that the present amount of direct care equals quality care and that there is no relationship between indirect care and direct care. No rationale was given for either of these assumptions.

The report is suggestive of a way by which prediction of staff needs can be derived. It is unfortunate that some of the basic steps of the procedure were omitted. The ideas of weighted factors for aspects of care and the development of a prediction table of profile indices are logical and appealing. The report, therefore, has value in the consideration of a staffing methodology. It clearly identifies many of the variables that must be considered in any purpose for staffing.

B12. Foley, Genevieve. "A Study of the Opinions of Nursing Service Administrators Concerning the Role of the Clinical Specialist." Project for Nursing Course 701, University of Pennsylvania, Philadelphia, Pennsylvania, May 1970.

Review

Purpose.—To discover the opinions of nursing service administrators concerning the clinical nursing specialist.

Method.—Ten hospitals were nonrandomly selected on the basis of their location and their accessibility to public transportation. All were located within a 20-mile radius of Philadelphia's city limits.

A formal letter was sent to the director of nursing service of each hospital requesting permission to conduct the study. The director, her assistant or associate, and three supervisors were asked to participate. The sample included 10 directors, nine assistant directors, and 28 supervisors. Two hospitals employed clinical specialists that were defined as nurses with master's degree preparation functioning in an area of clinical specialization.

The techniques used in the collection of data were the questionnaire and the interview. In the first part of the questionnaire, the roles of the clinical specialist cited in the literature were randomly placed in two columns. Instructions requested the respondent to rank the items in terms of importance to her as a nursing service administrator. Five forced-choice items comprised the second part of the questionnaire, in order to assess the nursing service administrator's perception of the importance of concepts currently under discussion. The interview grew out of a need to allow the nursing service administrator an opportunity to express an opinion on any roles of the clinical specialist not contained in the questionnaire list.

Findings.—A frequency distribution was made of the rankings given to each role. No clear conclusions could be drawn by the investigator from these data. The data were regrouped by adding the frequencies of positions 1, 2, and 3 for each role. The result of combining the frequencies showed the first three positions of importance to be that of practitioner, consultant, and coordinator. Those roles assigned to positions of low importance are researcher, physician's assistant, change agent, collaborator, and role model.

In the second part of the questionnaire, the nursing service administrators were asked to respond to five forced-choice items concerning how the administrators would like the clinical specialist to function. The responses indicate a number of alternatives. The respondents may not view the clinical specialist as a person involved with the direct nursing care of patients. The clinical specialist may be seen as someone possessing the education and expertise not ordinarily associated with the bedside nurse. Those concerned with the issue of power for the clinical specialist may view her in an administrative role more akin to the supervisor. The supervisors may identify with the clinical specialist as an expert in nursing care.

The data obtained from the interview revealed a greater degree of dissonance among the director, assistant director, and supervisor groups than did the data obtained from the questionnaire. It was noted that as the administrative hierarchy is descended, the issues become more emotionally charged. There is some evidence that indicates that a number of people are not sure of the clinical specialist's placement in the organizational hierarchy and consequently are uncertain of their appropriate response to her coming.

Conclusions.—In this sample, the roles of the clinical specialist are not crystallized at this time. The raw data demonstrated no clear preference for specific roles. A trend emerged only when the data were grouped. The author feels that few conclusions can be drawn from the forced-choice section of the questionnaire.

Implications.—The clinical specialist must have a realistic outlook on her own abilities and must be able to communicate this self knowledge to her future employer. Once mutual expectations have been articulated and clarified, it is then possible for the clinical specialist to look at the system she is about to enter. Another ramification concerns the issue of placement of the specialist in the nursing hierarchy. Another implication arises from the low position accorded the role of change agent. The stress on both the practitioner and educator roles implies that the endorsement of clinical specialist as possessing a specific role concept poses a challenge both to nursing education and nursing service.

In summary, the problems presented by the nursing service administrators who participated in the study reflect concern for a wide range of issues. The implication is clear that the clinical specialist must be sensitive to the needs and problems of the organization and the people comprising the organization. She must possess a sound theoretical foundation in the technique of problem solving. She must be able to implement her judgments in light of the principles of planned change and interpersonal relations.

Critique

There is a high priority placed upon the impact of the role of clinical nursing specialist and what that role is or should be. The introduction of a new role into an existing organization, especially when the role ambiguity is great and the hierarchical arrangement unknown to others in the system, can be fraught with problems. What impact this ne wrole has upon staffing patterns and mixes has not been examined in any systematic fashion.

This is a descriptive study dealing with this question. The questionnaire used to gather data had been built upon findings in the literature, but it had not been pretested for reliability and there was no attempt to obtain an estimate of face validity. The weakness in the study revolves around the small sample, the construction of the tool and its use, and the limited analysis of the data.

The review of the literature pertaining to the development of the role in the profession and the use of the clinical nursing specialist in various settings is very well done. However, the interpretation of the findings was limited and did not relate the ambiguity of the role to its historical evolution or to the theory of role conflict or strain.

B13. Hughes, Dorothy. "Activities of Three Nursing Service Supervisors in a Selected Governmental Hospital." A Project submitted in partial fulfillment of the course requirements for Nursing 477, DePaul University, Chicago, Illinois, 1962.

Review

The problem is, nursing supervisors are well prepared and understand their job functions, but demands are made upon their time that do not allow them to function to the fullest extent in all phases of their job descriptions.

Purpose— • To review activities essential to unit administration; • to provide nursing service supervisors with a better understanding of what they are doing; • to survey (by direct observation) the activities of the medical, surgical, and neuropsychiatric nursing service supervisors; and • to show what types of activities are most time consuming and which are done most frequently.

Assumptions— • Supervision is a necessary function in any organization; • nursing service supervision is primarily concerned with personnel; • supervisory activities are time consuming; • some nonnursing activities carried out by nursing supervisors might better be carried out by other hospital service departments; • duties of nursing supervisors include those listed in the ANA Statement of Functions, Standards and Qualifications for Nursing Service Supervisors; and • supervisory activities will be typical of the work they do.

Hypothesis.—Nursing service supervisors spend more time each day engaged in personnel activities than in any other area.

Limitations.—The study was limited to the quarter that the investigator spent in field work at the West Side Veterans Administration Hospital. The population is limited to one medical, one surgical, and one neuropsychiatric supervisor. The supervisors were observed during their regular tour of duty (7:30 a.m. to 4 p.m.) for a period of 2 days.

Method.—The normative survey method and direct observation was used in the study for collectors of data.

A collection sheet (appendix B) was used by the investigator who accompanied the selected supervisor on her entire tour of duty, leaving her only for privacy needs. Data were collected in chronological order. The time the activity was initiated and number of minutes required for the activity were recorded in the appropriate column. Supervisor's initials and the number of the data collection sheet, time required and category of activity (coded) were placed on 2x3 cards (sample included) for ease of checking and cross checking results.

Advanced planning for the study included approval of chief nurse and orientation of supervisors and all other involved personnel. Emphasis was placed on the fact that what is being done and the amount of time devoted to each activity are being measured rather than quality of work.

Data were then categorized according to categories suggested by the USPHS: (a) patient care activities, (b) personnel activities, (c) unit activities, (d) personal activities, and (e) miscellaneous (added by the investigator). Each category of the four categories is broken down into more specific activities under each category. (An outline is included.) Activities are coded for use in tabulation. Data are organized into tables or graphs (included in study) and presented in terms of percentages of time spent in each activity by all three supervisors.

Conclusions.—Nursing supervisors spend about the same percentage of time in each of the activity areas. An average time of 38 percent of the total time was spent in the personnel category, 30 percent in the patient care category, 14 percent in personal activities; 12 percent in unit administration, and 6 percent in miscellaneous activities. The hypothesis was proved, as the personnel area was most time consuming. The 12 percent spent in unit management was comprised mainly of requisitioning equipment and supplies.

The results of the study showed that supervisors must necessarily devote more time to certain activities than to others.

Recommendations.—To determine activity patterns of nursing supervisors in acute, general, nongovernmental hospitals through a similar study; to determine activity areas for the evening supervisor; to investigate the possibility of delegating the responsibility for ordering new equipment and preparing repair requisitions to a more appropriate department.

Critique

The impact of staffing problems and personnel administration upon the activities of supervisors has been alluded to in a number of articles. How much of the supervisor's time is spent on these activities is a concern to be dealt with in staffing predictions. This term paper has been included in the review to show one approach to the determination of time spent by supervisors.

The sample in this field study is too small to draw conclusions. The method involved continuous observation in a one-to-one ratio. Recognition of the distortion effect of such close observation on activities was not raised by the author. The techniques of recording data, coding them, and their analysis are useful suggestions. The study draws upon the work of the Division of Nursing, USPHS, demonstrating the impact of the approach suggested by it.

B14. Inman, Ursala. "The Study of Nursing Care." Paper presented for the Meeting of the Steering Committee, Royal College of Nursing and National Council of Nurses of the United Kingdom, Henrietta Place, Cavendish Square, London, England, March 9, 1971. (Mimeographed).

Review

This is a progress report on the project "The Study of Nursing Care" and reviews the study activity to date and the problems that have been encountered. The long range hope of the research leader, after having spent time on the project and reviewing the literature, is "to show that given such and such conditions, this type of care is better than that, and to develop a range of instruments to demonstrate differing standards."

The research team has developed several difficult types of instruments. The project leader suggests that: separate scales are required for medical and for surgical patients. She believes that the effectiveness of nursing must be judged in a carefully defined context and measurment related to specific care.

She proposes that the research effort be directed toward preparation of a ward management scale that will include:

- effectiveness of ward organization,
- ward facilities and environment,
- ward policy,
- ward practice,
- potentially dangerous practices,
- patient satisfaction.

Critique

This report is relevant, but data are incomplete. One should follow with care its execution.

B15. Jelinek, Richard C. "Methods for Scheduling." Paper published in the *Proceedings, Fifth National Conference, The Computer Society of Canada.* Banff, Alberta, Canada, May 1966.

Review

This paper presents a general discussion of the scheduling problem rather than a discussion of some specific area of scheduling application.

The author believes that in many cases the application of objective scheduling procedures can result in significant gains in solving scheduling problems and can be made practical and economically feasible by the rise of electronic computer capability.

Purpose.—"It is the purpose of this paper to structure the scheduling function and to summarize the various scheduling methodologies. In addition, forecasting, which is an activity that has to be performed in conjunction with scheduling, will be related to the scheduling function and various forecasting methodologies will also be summarized."

Method.—The scheduling function may be represented in three phases: production planning, allocation, and sequencing.

The results of the *production planning* phase are the foundation upon which the structure of the scheduling problem is designed. Forecasting techniques that predict the levels of the factors used to make long range production decisions may be extremely useful in the production planning phase. Four types of forecasting include: • subjective opinion, • average, • time trend, and • functional relationships. A forecast is an estimate of the level of a specified factor or variable for some future period of time. The factor or variable for which a forecast is made is generally one that has been present and observed in the past. A subjective opinion forecast is simply a guess. The commonly used forecast based on an average assumes that a process is stationary. (A discussion of two classifications of processes is included. Processes may be classified as • determination or stochastic and • stationary or nonstationary.) The forecast based on time trend uses such observed stochastic processes as overtime to make predictions. Two statistical techniques available for this analysis are presented as follows. The moving-average forecast is the sum of the data points for the desired number of past periods divided by the number of data points included in the sum. The exponential smoothing forecast considers all past data but places more emphasis on more recent data. The fourth type of forecasting is based on functional relationships and is used for obtaining estimates which can be analyzed in terms of regression analysis and analysis of variance.

The second major phase in the scheduling function is *allocation*. An allocation problem is one of combining activities and resources to maximize overall effectiveness. The tools that are most commonly used to solve allocation problems are techniques of mathematical programing, of which linear programing is most widely used. In addition, heuristic programing and digital simulation are practical and frequently used techniques for solving this class of problems. The most practical aspect of both allocation and sequencing is the need to formulate and quantify the specific problem. This is accomplished by constructing a model.

The third phase of scheduling is *sequencing*, in which there is concern with three types of problems. These are scheduling arrivals or demands, determining the sequence in which a series of tasks are to be done, and scheduling activities for individual projects. In all three cases, the solutions are obtained with the objective of minimizing the sum of the pertinent costs. Queuing theory can be valuable in describing performance of the system under any given set of conditions and is useful in scheduling arrivals or demands. Analytical solutions to determining the performance sequence of a series of tasks are restricted to very simple cases and thus have little practical value. The heuristic programing approach along with digital simulation techniques are the most fruitful approaches to the complex. The techniques available for the solution of scheduling activities are generally referred to as PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method) analysis.

Critique

The content of this paper does not include any direct reference to measurement of patient care requirements or to nursing activity. It relates only indirectly to nurse staffing. However, since scheduling is a major problem in staffing a unit, the article is important.

The paper is technical. But since it is written in a relatively simple style and provides background information necessary for prediction of staff and resources, the article is of particular value to this review. The paper is useful to the reader and is unsophisticated about the approach, the language, and the methodologies used in operations research. Jelinek also gives a simple explanation of multivariate regression techniques. Therefore, reading this paper helps to understand his work and that of others using these techniques.

B16. Jelinek, Richard C. "Resource Allocation Problem," (no date). (Mimeographed.)

Review

This paper is a brief description of a workable solution to an allocation problem. The resource allocation problem may be either one of specifying the activities or jobs that need to be performed and determining the mixture of resources so as to yield maximum effectiveness or specifying the resources available and determining the most desirable mixture of activities or jobs. A 'mathematical formula' represents this problem in a quantitative manner. This requires the determination of the objective for the problem, such as minimizing cost and establishing relationships between the factors under consideration.

The allocation problem is illustrated by dealing with the allocation of food items to prepare a diet. The objective is to determine the amount of each food item that will give us the lowest cost diet yet satisfy nutrition requirements. The minimum requirements, the food value, and the cost of food are presented. A standard linear programing formulation of this problem is described in six expressions.

Numerous computational procedures (algorithms) have been developed. The simplex algorithm is the most common. This analytical solution guarantees optimal results for the defined problem and its specific assumptions. If the problem formulation does not adhere to the linear conditions, the mathematical model is often too complex or not applicable. Approximate solutions may be obtained by using enumerations, random search, or some heuristic approach.

Illustrations of three types of allocations problems include general allocations problem, transportation problem, and assignment problem.

Critique

This paper has been written by one who has been recognized as an individual greatly interested in the application of operations research to nurse staffing problems. Since nurse staffing is a major allocation problem, a discourse on the topic is related to this literature review.

The paper is logically developed and well written. The examples used in the discussion assist in the clarification of the concept being developed. The translation of the examples of the concrete variables into mathematical expressions is excellent. The paper is useful for this purpose. Unfortunately, in reading the paper one senses a lack of psychological closure at the end.

B17. Kossack, Carl F., and Longere, Ruth. "On the Measurement of the Nursing Load in a Hospital." Unpublished study, Methodist Hospital, Indianapolis, Indiana, (no date).

Review

Purpose.—"To develop a method of measuring the total amount of nursing care required by a hospital for any given day so as to be able to show the change in this load over a period of time with its resulting effect upon the need for nursing staff."

"To develop a standard method of estimating the daily nursing load for each nursing unit of a hospital with an accompanying nursing assignment technique that will enable nursing administrators to meet the day-to-day variation in nursing needs of each unit."

Sample.—During a 3-month period, nursing load data were collected on a medical unit and a medical-surgical unit.

Instruments and procedure.—The Nursing Needs Summary Sheet and the Nursing Assignment Work

Sheet were instruments used to collect data. The Nursing Needs Sheet obtains information as to the degree of difficulty level multiplied by the weight factor. The Nursing Assignment Sheet includes the level of each patient and the total number of medications and treatments.

With the help of experienced nurses at Methodist Hospital, a rating system was developed that classified each patient according to "degree of difficulty." A schedule of elementary direct nursing tasks was developed. Six main categories of nursing tasks were derived with a varying number of subcategories including routine bed care, feeding, condition observations, observation, treatment, and medications. A limited number of "degree of difficulty" classes were developed in which one could classify each nursing situation in order to determine total nursing time required by each type of patient. "To assign to each 'degree of difficulty' class the appropriate set of elementary nursing tasks, a typical diagnosis was associated with each class and the nursing tasks and time were determined for this type of diagnosis." Nine different "degree of difficulty" classes were developed and include these typical diagnoses: simple recuperative, appendectomy, hysterectomy, cholecystectomy, ulcerative colitis, pyelitis, dermatitis, thoracotomy, and cardiac. Each "degree of difficulty" class was assigned a frequency for each direct nursing care task These tasks were assigned a time factor indicating the number of minutes required by the average nurse to perform the tasks. The total direct time was computed and the level of nursing skill required was indicated. Inconsistencies in arriving at these estimates were resolved by conferences between the study group members.

Observed nursing time was compared with assigned nursing time. The percent error showed considerable variation but the variation was in general positive and independent of the degree of difficulty. "The fact that the percent error is relatively constant over the whole range of nursing times and represents approximately what one would expect such a bias to equal under the current shortage of nurses gives support to the overall validity of Table I" (Estimation Study). The last step in establishing direct nursing care required by patients was to "smooth the values" in order to produce a set of values that was internally consistent. "The smoothing was done using a simple differencing approach."

In order for the method of patient classification to be readily used by the head nurse, the more common diagnoses were broken into phases representing a distinct nursing situation into which a patient with the diagnosis may enter during his stay in the hospital. Each common diagnosis was broken into phases, each phase representing a distinct nursing situation that a patient with the diagnosis may enter during his stay in the hospital. Each phase was assigned an appropriate "degree of difficulty" rating. The head nurse could change the degree of difficulty rating by one degree if the patient exhibited characteristics that made his nursing requirement significantly lighter or heavier than the average patient. For the patients with a less common diagnosis, a listing was prepared that exhibits for each "degree of difficulty" class some common nursing situations that fall within that class. The patients are assigned to a certain difficulty class according to the judgment of the head nurse with the aid of this listing.

To translate the requirement for direct care into total nursing care, a fraction of a nurse's time devoted to direct care was needed for each type nurse. A questionnaire was given to a representative group of nurses that asked her to record her direct nursing activity for an assigned day. This method of estimating fractions of time devoted to direct care was unreliable because of the many inconsistencies. A study at the Harper Hospital showed that two-thirds of the nurse's time was spent in direct nursing care. This value was used as a basis for the preliminary staffing estimates used in this study.

A method of collecting patient data for each unit was developed. The Nursing Assignment Work Sheet required the name of patient and diagnosis to be filled in by the ward clerk. The head nurse was to indicate the degree of difficulty (expected value for following day). The ward clerk was to compute the Nursing Need Summary Sheet. The weight given to the degree of difficulty was multiplied by .003. The computation of this factor was based on the assumption of an 8-hour day, and the amount of direct care estimated at 70 percent.

$$\left(\frac{1}{8 \times 60 \times .70} = .003\right)$$

To determine the distribution of patients by degree of nursing difficulty, the number of patients in each degree of difficulty was computed for the average day. The difference in the distributions of two units showed wide variation.

A comparison was made of the required nursing staff as computed by the degree of difficulty formula and the actual number of nurses on duty. On a typical day, the shortage of practical nurses and aides (Type B) was twice that of graduate and student nurses (Type A). "This study also indicates that there exist an ample amount of additional nursing tasks within a hospital that can be assigned to individuals who fall within the Type B class."

Using the results from Nursing Needs Summary Sheet, the total nursing staff required for each unit was determined for each day. Using these results one could determine how large a nursing staff one should assign to obtain a given balance between days of overstaffing and days of understaffing. For example, if 10 nurses were assigned to a unit, 6 percent of the days the unit would be overstaffed and 36 percent of the days it would be understaffed. If there were 11 regularly assigned nurses, there would be 26 percent overstaffed days and 8 percent understaffed days.

To compare the head nurse's estimate of the type of day with the calculated shortage of nurses, the average shortage of nurses for each type of day was determined for each unit and plotted on a chart against the head nurse's estimate of the type of day. "These results gave additional validation of the study since one can observe the correlation between type of day and shortage of nurses."

"The results of this study indicate that one can measure the nursing needs within a hospital so as to meet the objectives mentioned." The author states that the study appeared to develop a method of showing overall nursing needs and long-term trends.

Critique

This paper describes the experience of one hospital nursing staff who, with the assistance of an engineering consultant, explored the problem of predicting for nurse staffing. The report is relevant to the question of nurse-staffing methodology since it depicts an attempt to measure nursing load in a hospital.

The study is intriguing in its approach. Four variables (degree of patient difficulty, frequency of nursing task, level of skill, and time) are combined to establish standard values that can be used in predicting numbers of staff required to care for a group of patients. Furthermore, a comparison of observed time required to perform care for various levels of patients with the standard time proposed, which had been established by judgment, was included in the exploration of the problem.

The report of the work was apparently written for meetings in the local hospital. Many questions about the rationale underlying the approach, the development of the instruments and testing them for reliability and validity, the sample size and the content of the definitions remain unanswered. Because of these limitations, no confidence can be placed in the tools or in the few findings suggested by the authors.

Nevertheless, certain features of the approach merit attention. The concept of difficulty of nursing situations (though very crudely developed), the testing for bias of estimated time, and the recognition of the relationship between skill level, frequency of task, and time required to perform it are worthy of consideration in developing a methodology.

B18. Ludwig, Patric E. "Establishing Staffing Criteria for Evaluating Nursing Service Functions—A Management Engineering Contribution." Papers presented at the Third Annual Meeting, Council of Hospital and Related Institutional Nursing Services. New York: National League for Nursing, 10 Columbus Circle, New York, 1969.

Review

This report is concerned with a description of several nursing studies in which the measurement techniques (work sampling and application of standard work data) were used to evaluate nursing functions. The studies referred to include the hospital management programs in New York State and those conducted in California, Maryland, and Massachusetts. These studies involved approximately 200 institutions.

There are three approaches to the evaluation of nursing functions:

A. Quality Control Plan developed by CASH. Philosophy of this plan is that "Certain attributes can be measured and controlled and that when these attributes are checked out, it is probable that good quality nursing care is being given on the unit. . . ." (Not described in detail.)

B. Developing a system for scientifically measuring department personnel requirements and utilization. Patients were classified by illness, age, sex, and diagnosis. The kind of nursing tasks performed by types of nursing personnel, the frequency, and the time of day and hour were noted. These task times were measured by standard work data rather than by work sampling method. Better than 80 percent of the tasks normally performed by nurses have been studied by various organizations. For most of the tasks, several methods of performance have been documented and timed. Sources of this information include CASH, CSF, VA, the New Jersey Hospital Association, and many individual institutions.

C. To determine patient requirements, the amount of care given each patient is recorded on a form that indicates the classification of patient and allows the personnel that is performing the activity to record the time according to 1-hour intervals. This information is collected over a 14-day period. Condition classification for most studies is based on a system made popular by Dr. Robert J. Connor of Johns Hopkins University. Patient requirements are those activities "identified by the nursing director and her head nurses as the ones that should be performed by the nurses on that unit."

Using 5,000 patient days, it was found that in one day the "average" patient required 2.9 hours of nursing care. This value was obtained by noting that the "average patient" required 63.2 tasks per day and the "average nursing task took 2 minutes and 47 seconds to perform.

Individual and combined findings strongly indicated that the older patients required considerably more nursing care, the amount ranging from 36 to 54 minutes more per patient day for the over 65 age group.

Variations in skill distribution seemed to be due mainly to such external factors as availability of particular skills and accessibility to nursing education institutions.

It is quite apparent that the types of patients assigned on a unit do have a decided effect on the types of nursing skills needed to care for them.

The findings did indicate that only the smaller units, which were subject to considerable daily variations in the patient condition mix, should staff in accordance with the patient classification system.

(Many other findings and conclusions are mentioned in this report. No attempt is made to describe any statistical basis for these conclusions.)

Critique

This paper summarizes the approach and some of the major findings of studies conducted in individual hospitals by CASH, the Hospital Association of New York State and the Western New York Hospital Association, CSF of Maryland, and the Massachusetts Hospital Association. Since the article gives an overview of the various approaches to nurse-staffing methodology that use the techniques of industrial management and systems engineering, it is a relevant article in a review of the literature.

The article describes in general terms the techniques used, the types of data obtained, and their treatment. The author cautions against generalizing from "average" data since the data are very specific to the institution in which they were found.

The value of this article lies not in the findings presented or the description of the various aspects in the methodology. The value lies in its provision of a viewpoint regarding the use of the methodology, its limitations, and the philosophy underlying the methodology.

B19. Ludwig, Patric E., and Sander, Edward J. "Results of the Nurse Utilization and Staffing Control Methodology for DeGraff Memorial Hospital." A report prepared by Hospital Management Engineering Program, Buffalo, New York: Western New York Hospital Association, February-June 1968.

Review

Purpose.—This document contains the results of the application of the management engineering methodology, adopted by the Hospital Management Engineering Program, WNYHA, for this particular hospital. The covering letter indicates that this brochure reflects a group effort to collect data for "the establishment of better predictive tools for determining patient care requirements." It was viewed also as a beginning attempt to quantitatively indicate nursing care requirements.

In essence, the results were the development of a nurse staffing table and procedures for its use, the establishment of management control mechanisms, specific recommendations for changes in existing patterns, and the establishment of a messenger service.

Method.—The methodology was not described in detail, but it appeared to consist of these steps: (a) identification of "basic" nursing tasks performed for all patients regardless of age, sex, diagnosis, or condition on one nursing unit. The frequency, the time of day performed, and the skill involved were determined. (The report gave only 13 such tasks, relating to admission, discharge, medications, paperwork, and reports); (b) the identification of the special nursing tasks that varied as a function of the patient's condition on one nursing unit. A 14-day around the clock survey on each patient resulted in a compilation of the frequency of the tasks, the skill level by which they were performed, and information as to the time of day they were performed; (c) a classification of all patients on the medical-surgical nursing unit by level of care required. Patients were classified as self-care, partial care, and complete care; (d) the use of a computer to condense the mass of data into readouts so that the data resulted in tabular information that could be converted into profiles of work distribution, of patient classification, and of task frequency by skill, by patient condition, by shift, and by amount of time based on predetermined time standards.

The tools used were checklists completed by nursing personnel. Definitions were not developed for the nursing tasks (97 alphabetically arranged). Brief descriptive comments were guidelines for classifications of the patients.

The nurse staffing table was "based upon the actual care rendered to patients, quantitatively derived." In the table, the total number of hours scheduled for all skills was equal to or slightly higher than the number of hours required.

The work distribution profile showed that placement of certain tasks resulted in an unevenness of work flow so a suggestion was made for redistribution for better utilization.

Critique

This is a result of a survey conducted in one hospital and is based upon a methodology very similar to that prescribed by CASH. The weaknesses in the approach are • nursing practice, perceived as a series of tasks, is primarily physical care in origin. The opportunity of psychosocial acts is limited. The overlapping of the acts is not provided for. There is no statement of operational definitions; • classification of patients resides primarily within physiological dimensions; • the basis for time standards is not given and neither is the rationale for computation for total time; and • there is no information given as to the rationale for selecting one nursing unit as the basis of setting nursing care requirements on all medical-surgical nursing units. Data are collected for 2 weeks, but the size of the patient sample upon which they are based was not given.

There is insufficient evidence in the report to determine what was the actual design of the study, the reliability or validity of the data obtained, and the rationale upon which the prediction is based. The author suggested that a full description of the methodology be obtained.

Because of the lack of information and the failure to provide a full picture of the methodology, the sample, the reliability, and the validity of the data, no conclusions can be drawn. It is likewise impossible to assess the value of this project in relation to the whole question of nurse staffing methodology.

B20. Ludwig, Patric E., and Sander, Edward J. "Results of Nurse Utilization and Staffing Control Methodology." Research Report supported by Hospital Management Engineering Program, Buffalo, New York: Western New York Hospital Association, November 1967-March 1968.

Review

Purpose.—To determine the nursing care requirements of medical-surgical patients.

Method.—Routine nursing tasks administered to all patients, regardless of age, sex, diagnosis or condition, were identified and counted. Predetermined time standards were applied to determine the amount of nursing time by skill level that was involved in basic nursing care. To determine the nursing man-hours required for the special nursing tasks that vary as a function of patient condition, patients were classified and a 2-week, 24-hour a day survey was made. The nursing skills required were taken into consideration. Quantitative guidelines for medical-surgical nurse staffing requirements were developed. Work distribution profiles were developed that indicated the times of days certain tasks were performed as well as the time required. (Further detail is included in the "Nurses Utilization and Staffing Control Methodology" published by the Hospital Management Engineering Program of the Western New York Hospital Association.)

The identification of routine nursing tasks refers to the appendix entitled, "Basic Care Analysis." A listing of 25 basic care tasks includes: admit, bed change, discharge, strip beds, linen disposal, paperwork, report—supervisory, trays—pass, and trays—pickup. Basic care, as a percent of total care, consists of the following:

self-care patient—79 percent
partial care patient—51 percent
complete care patient—41 percent

No explanation of the inclusions of the basic care tasks or the process of computing basic care as a percentage of total care is given.

The identification of patients and the frequency of special care tasks are included in the appendix entitled, "Special Care Analysis." The Special Care Report is a form that lists 116 nursing activities such as: ace bandaging, bed change—complete, discharge, irrigation—superpubic, position bed, tourniquets—rotating, weights. The time within a 24-hour period these activities are performed is indicated. The classification system is a straightforward list of activities included in Category I—Self-Care, Category II—Partial Care, and Category III—Complete Care. Four items under self-care are as follows: self-baths, feed, ambulatory to be discharged, surgery—not returned, and admitted—except emergency. Category II consists of 10 activities such as assist to bathe or feed and ambulate or complete bath for Category I or II patients, parenteral fluids—up to 3/shifts, slight emotional needs versus more stable condition, intermittent oxygen therapy, and surgery—returned. The 10 activities in Category III include frequent deep suctioning; unconscious; vital signs ordered—over 3/shifts; isolation—complete; and close observation for impending hemorrhage, hypo-hypertension, or cardiac arrhythmias.

Copies of notices prepared and disseminated to the patients and personnel are included in the appendix.

Findings.—Data from the basic and special care analyses were computed to determine the amounts of care rendered to medical and surgical patients of varying degrees of illness by the different nursing skill levels staffed on each shift. This information was used to develop a nurse staffing table based upon the patient care requirements, to examine possible improvements in staffing patterns, and as a means for establishing better management control over the utilization of nurse staff time.

The number of self-care, partial care, and complete care patients is needed to use the Nurse Staffing Table. The table is a tool for determining the amounts and kinds of nursing skills required for a given nursing unit for any given patient mix. By comparing the nursing time required with what is provided, the utilization is determined.

During the survey period, the average daily patient mix was determined. The Nurse Staffing Table indicated the average nurse requirements. The utilization is based on nursing time required compared with what is provided. The utilization figure showed that the evening shift was properly staffed, but that overstaffing existed on both the day and night shifts.

Personnel scheduling systems must be analyzed in addition to application of nursing staffing tables. The "work contribution" of student nurses and scheduling to meet the desires of the nursing staff were two factors in developing actual personnel schedules. The data indicated that students administered 10.8 percent of the total nursing care administered on the day shift during the survey period. Since students were on duty less than half of the time, this average would indicate that students give better than 10 percent of the total care when they are present. Analysis also indicates that full-time schedules do not appear to reflect the presence or absence of students, and that nurse staff utilization is much lower on the day and night shifts. Schedules also do not appear to reflect the actual needs of the patients but rather the desires of the nursing staff.

To further improve the utilization of nursing staff, certain nursing tasks must be rescheduled. "The Workload Distribution Profile" shows a nonuniform workload during the course of the day. Many routine tasks that nursing itself schedules are the major contributions to the uneven workload. A rearrangement of certain care activities would enable different scheduling of personnel. The skill involvement for the various tasks is not noted on this Workload Distribution Profile. Data indicated that registered nurses were busier than auxiliary nursing personnel on the evening shift, indicating improper delegation of work and desk functions as a result of ward clerks absence. Workload distribution indicates that during the hours when the shifts are changing there is much idle time. Reporting on this unit on time to receive job assignments in a prompt and orderly manner may prevent this.

A Daily Staff Requirement Report and Weekly Performance Report are needed to continually meet the needs of patients and to achieve effective utilization of the nursing staff time. A Nursing Hour Summary Report is completed every 2 weeks from the Weekly Performance Report and submitted to the Hospital Management Engineering Program, Western New York Hospital Association.

A Daily Staff Requirement Report is designed to allow nursing supervision to determine the approximate staff requirements before the start of the shift, based on the estimated number of patients and estimated nursing needs. A recommended procedure for completing this form is explained in great detail. The Weekly Performance Report is designed to provide a weekly management control for each unit. The daily and weekly utilization indexes can be analyzed in relation to census and variations in staffing. Instructions for completion of this report are presented in detail.

Summary.—The author suggests that the most important aspect of this study is the development of the Nurse Staffing Table since the table notes the amount of care rendered to patients of varying degrees of illness by different nursing shifts.

Critique

This report, which serves as a model of the staffing approach to be used in other hospitals holding membership in the Western New York Hospital Association, is highly pertinent to a study of the approaches to nurse staffing determination. First, it is the test of the approach taken; second, the reports, instruments, and collection procedures are well illustrated.

The approach closely follows that developed by CASH. It consists of task count of nursing procedures, the use of predetermined time standards, and the classification of patients into three categories. The authors state in their synopsis that there was no attempt to measure "quality" of care. The report includes no basic rationale for the methodology. The survey time was adequate, the data are presented logically, and the tables are clear.

Two recommendations are confusing and questionable. First, the proposal that a highly skilled licensed practical nurse be used on the night shift instead of a registered nurse is not clear. The data of two tables are in conflict. Second, the proposal that students' time be calculated in the staffing pattern and allocation leads one to believe that the consultant is not up-to-date on nursing educational practices.

The report makes no reference to other studies or research reports. Its results are applicable only to the hospital and the nursing unit referred to in the contents.

The value of the study is in its testimony of the application of this group's methodology. It illustrates that the approach is feasible. Whether the rationale upon which it is based is sound and whether or not it generates reliable and valid data are questionable.

B21. Lutz, Esther L. "Reasons for Resignation as Stated in Letters of Resignation Compared with Reasons Stated During Post-Employment Interview." Project for Nursing Course N701, University of Pennsylvania, Philadelphia, Pennsylvania, 1968.

Review

Purpose.—To investigate the causes for resignation by studying the reasons stated in letters of resignation versus the reasons offered at a later date in a personal interview after termination of employment.

Methodology.—The hospitals chosen had similar facilities and a narrow range in size. They were four voluntary nonprofit general hospitals located in metropolitan Philadelphia.

During the 4-month period, 46 professional nurse resignations occurred. Of this group, 21 nurses had moved from the area; nine were unable to be contacted; and four refused to be interviewed. Of the remaining nurses, 25 were used in the sample.

The interview was designed to locate sources of satisfaction and dissatisfaction that may have been factors in causing the nurse to resign from her job and to determine whether she stated these satisfactions or dissatisfactions in her letter of resignation. The questions asked in this interview were related to the broad areas of work assignment, job responsibility, personnel policies, orientation and inservice education, and attitudes toward administrative personnel and their functions. The questions asked were of the open-end type, which permitted the nurse to respond with a short answer. The interview was pretested using two nurses that had resigned from their jobs to clarify the questions and to determine the length of the interview. The validity and reliability of the interview tool have not been tested.

In an attempt to control bias, the letter of resignation was read after the interview was conducted.

Findings.—The analysis of the findings permit the following conclusions: • Some nurses give different reasons for resignation during the postemployment interview than those stated in letters of resignation. • Nurses who left their jobs because of dissatisfaction did not state these dissatisfactions in the letter of resignation but gave an innocuous reason. Most nurses felt letters of resignation were not helpful to administrators in locating problems. • The exit interview was not generally used by nursing service departments. • In general, personnel policies were not an area of dissatisfaction except for part-time policies, time schedules, and shift rotation policies that were caused by lack of advance planning. Nurses were satisfied with their salaries. • Most nurses would recommend employment to their friends in the hospital from which they resigned because the work environment was pleasant. • While a majority of the nurses felt they were able to offer suggestions to the administration, they also indicated that they rarely saw changes being made as a result of their suggestions. • Most of the nurses interviewed did not feel there was a shortage of nursing staff in the hospital in which they were employed. • Some of the nurses believed that nurses in administration were aware and understood the problems related to patient care. However, most of the nurses felt that nursing administrators were unable to cope with these problems or implement change. • Student nurses who were employed by the hospital from which they graduated were frequently not assisted through the transition from the role of student to the role of a graduate nurse. • Most of the hospitals provided inservice education programs for the nurses.

Critique

The high turnover rate of general staff nurses merits investigation, since the stated reason for leaving has not been validated. This master's thesis is an attempt, recognizably limited, to examine whether the same reason would be presented in an interview as is stated in the formal letter of resignation.

The sample size of the study is small and nonrandom. The tools used have questionable reliability and validity. The analysis of data is restricted to simple descriptive percentages.

The project itself has a very limited conceptual base, failing to draw upon studies of job satisfaction or dissatisfaction, of commitment, and of the socialization process of professionals. Its contribution is one of suggesting topics for further study since its own limitations are very apparent. It is related to nurse staffing since work overload, frustration with functions, and misuse of talents are associated with staffing number and mix.

B22. Madden, Barbara Williams. "A Study of Staffing Needs on Long Term Wards at Rancho Los Amigos Hospital." Unpublished study, Los Angeles, California, (no date).

Review

Purpose.—To improve staffing in a long-term area.

Hypothesis.[1]—(a) Minimal nursing care for patients having long-term illnesses is jeopardized by a high occupancy of bedfast and severely handicapped patients.

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[1] "Hypothesis" singular is written in the review as shown in the study.

(b) Nursing needs increase in direct proportion to the admission of bedfast patients and of those unable to perform at least a portion of daily living activities.

(c) The services sacrificed when there is insufficient nursing services are those that increase human dignity and a feeling of worth.

Sample.—Two long-term wards in Rancho Los Amigos Hospital. Total bed capacity of each study ward is 43. Physical plan of wards is described.

Method.—Patients are classified according to physical condition including paraplegia, quadriplegia, hemiplegia, multiple sclerosis, severe contractures, and long-term illness. Nursing activities were divided into direct patient care and indirect patient care. A description of the activity under each heading appears in appendix IX (this appendix is not included in the material reviewed).

Charts for registered nurses, licensed vocational nurses, and attendants were prepared on which the time spent in patient care was recorded.

It is proposed that staffing be determined by the Fergusen formula. "(See appendix VIII)." (Not included in material sent.)

"A time study according to the various functions was developed, tested, collected, and compiled." A study in the women's ward was done in two phases. Phase II included an addition of one attendant in the day shift. A period of 2 weeks was used for each phase. The nurse investigator selected a sample of each group ranging from minimal to severe involvement. She then observed the care given to each patient and, using a stopwatch, timed each activity. She included in her observations all the care given to this sample throughout 24 hours. Indirect activity time was determined from charts that were used by all personnel to designate time spent on patient care by all three shifts.

The time spent in each activity by attendant, LVN, and RN showed that direct care takes 55.2 of the 75.6 available hours. Indirect care receives 20.4 hours of time in 24 hours.

In reviewing 24-hour activities of the registered nurse, 12.8 hours are spent on the ward with 43 patients. About half of her time is divided between supervision of patient care and staff and reporting. Over one-third of her time is spent in medications, nutrition, and decubitus care. Care of critical patients, talking with patients and families, and miscellaneous duties take up the remainder.

Conclusions.—When nursing time is increased from the bare minimum, activities that provide human dignity and feeling of worth receive more attention. With the addition of one attendant on the day shift, 2 more hours were spent in assisting patients in activities associated with elimination and nutrition, and in dressing patients. About 1 more hour was spent getting patients out of bed and talking with patients and families. Patients and staff were happier. The ward was quieter and patients were more able to participate in activities.

It is possible to know the time needed for care in a ward by determining the kinds of patients and the activities included in their care. On the men's ward, 72 hours and 30 minutes of nursing service is needed per day. On the women's ward, 98 hours and 17 minutes of nursing care in 24 hours is needed to provide safe minimum care to the kind of long-term patient currently admitted to this hospital.

Critique

This study was conducted within a large chronic hospital where many long-term patients are placed. The nursing care required by them was analyzed to determine the amounts of direct patient care and indirect care rendered and to learn what level of personnel performed the care. The data were obtained by means of a time study, using definitions of various categories that the staff developed.

The individual in charge of the study selected a sample of patients and observed and timed the care given each patient using a stopwatch. The amount of indirect activity time was made from records kept by the nursing personnel.

The contribution of the report is limited since the tools are not well described, and they are crude and untested. The method and procedure are only briefly described.

The value of this paper lies in its testimonial. It is an attempt of one nursing service director to obtain factual data upon which to base estimates of nurse staffing. It suggests the type of variables believed important for study and the criteria by which effects of a change in staffing can be evaluated.

B23. Moriconi, Joanne A. "A Study of Patient Categorization and Nurse Utilization." Unpublished Research Report, Peter Bent Brigham Hospital, Boston, Massachusetts, April 1970.

Review

Two studies, (a) "A Study on Patient Categorization and Nurse Utilization" and (b) "Nursing Care Requirements Study," which provides basic materials, are presented.

"A Study on Patient Categorization and Nurse Utilization"

Problem.—The survey was done to collect information that would describe adult medical and surgical populations according to their physical and emotional nursing needs on the medical and surgical units of Peter Bent Brigham Hospital.

Purpose.—The purpose of collecting this data was • to determine the need for a fourth classification of patients, • to investigate the practicality of categorization, • to assist in developing staffing patterns, • to determine the number of nursing hours required for each category of patients and • to investigate the utilization of the various levels of nursing service personnel.

Methodology.—The methodology was based on the CASH studies with additional activities analysis performed by the nursing staff for a 24-day period. (a) Number of nursing hours required for patients classified are placed into one of four categories and (b) percentage of activities performed by various levels of nursing service personnel during the activity analysis is computed.

Data collectors met with 23 nursing staff members, all category levels, who worked on the units, and are included in the survey. A method for categorization of patients was developed by the data collector. Patients were categorized the day after they were included in the study. An activity analysis form used was developed by a committee (sample included). Random selection of five patients and five alternates occurred each morning on the six medical and surgical nursing units. A total of 713 patients was included in the survey.

The patient classification system developed by the nursing service administrative resident in 1969 was used in this study with the addition of a Category IV. The nursing staff and committee hypothesized that Peter Bent Brigham Hospital had a higher proportion of extremely serious illnesses than a typical community hospital would have. This presented the need for a fourth category. The categories, • minimal care, • moderate care, • maximum care, and • intensive care, are based on the degree of nursing care required, including observation, treatment, and/or emotional support. Category IV describes the patient's acute state of disability expressed by diagnosis, symptoms, and state of awareness exhibited by the patient.

The second portion of the study is devoted to nursing time required. Activities performed are recorded on a data collection sheet on a random sample of patients for a 24-hour period. Standard times for activities were predetermined in the 1960 study. Approximately 30 patients were studied for a 24-hour period for 24 days. Data were collected from February 18, 1970 to March 13, 1970. A data collection sheet listing all procedures and activities was posted on each patient's bed. Personnel placed a checkmark whenever a procedure was performed. Data collector and head nurse, with the use of the kardex, classified patients into one of the four categories of care. Patients were categorized according to the point system by the data collector to provide consistency in the interpretation of the classification being used. The major activity areas considered were ambulation, bathroom, meals, medications, bath, mental attitude, and treatments. Each item was weighted according to extent of nursing care required.

Analysis of data.—In the analysis of the data, the total number of patients in each classification was converted to percentages for the period of the study on each nursing unit. These results and the total number and percent of patients in each of the four categories are shown in tables I and II.

Data from checklists of procedures were analyzed according to number of hours of nursing care required and classification of patients as determined by the category worksheet. Total nursing care such as paperwork, meals, etc., was given predetermined times, taken from the 1969 study and that of CASH. Average time for all patients was calculated each day. The summary of average hours per patient day required for each category of patient on each nursing unit and the summary of average hours per patient day required for each category on medical, surgical, and private services are presented in tables III and IV. Comparisons of numbers of nursing hours required according to categories and by services are made of the 1969 and 1970 studies and shown in table V. Private duty nursing care was included in the 1969 study and not in the 1970 study.

Summaries of average hours per patient day required for each category on the three services are computed from data sheets. Percentages of activities performed by various levels of nursing personnel on the units were determined. Six of the 89 activities were not performed by any level personnel; 76 were performed more by registered nurses than any other personnel level.

Conclusions.—It was concluded that categorizing patients as a means of developing staffing patterns is practical and should be done on a daily basis for 3 months. It was determined that need for Category IV was indicated since 14 percent of the population was in this category and 7.5 hours per 24 hours nursing care was required for their care. The majority of activities were performed by professional nurses indicating that other nursing service personnel are not utilized to their full capacity. The team nursing concept was believed to influence this beneficially. The author concluded that changes in proportions of nursing personnel are needed for better utilization.

Recommendation.—The establishment of a classification system to categorize patients on each unit, including Category IV, is recommended with the classification system and staffing patterns. Utilization of nursing hours as calculated in this survey should be used to assist in the establishment of a staffing pattern in conjunction with the classification system. Further investigation of activities performed in relation to patient care was recommended to determine the cause for the high proportion of professional nursing care.

"Nursing Care Requirements Study"

Purpose.—The purpose was to arrive at a more accurate assessment of nursing care requirements on the medical, surgical, and private pavilions to serve as a basis for staffing.

Method.—The method was based on the CASH studies. A committee of nursing personnel developed a patient classification system (sample included) to determine the percentage of patients in each category. Categories are based on the extent of nursing needs of patients, dependency, treatments, obseravtions, instruction and/or emotional. Three Categories, (I) Minimum care, (II) Moderate care and (III) Maximum care, are defined.

Data were collected on a checklist for each patient from December 19, 1968, to December 25, 1968, and January 6, 1969, to January 12, 1969. Total percentages of patients on each unit and on bed capacity are calculated.

Nursing time requirements were determined from a data collection sheet of activities performed for each procedure. The standard times were determined by observation and timing of nursing procedures and compared with those in the CASH study and on the basis of these, a standard was established. Fifty-four patients selected at random, a new sample each day, were studied for a 24-hour period for 10 days. The total sample was 540; data were collected from February 21, 1967, to March 3, 1969. Data collection sheets listing procedures and activities were posted on patients' beds and checked by nurses as procedures were performed. These were checked by head nurses for omissions and information needed to classify patients according to levels of care. Hours of patient care per day for each service were determined. Standard number of hours per patient per day was established.

Data analysis.—In the analyses of data, patients are classified according to percent of patients in each of the categories. The percent of vacant beds in each unit is given, and total averages for each position of the three services are computed (table I).

Data were analyzed according to (a) patient classification. Total numbers were converted to percentages in each of the three categories and the percent of vacant beds for the 2-week period is included in table I; and (b) nursing time requirements are presented according to shift, weekend and weekdays, and by classification of patients. A total average of hours per patient day needed on each pavilian, as well as total averages for each service for 10 days, are computed (method included). Five percent was added to totals (CASH method—to cover supervision and infrequent procedures). Results are shown in tables II, VII, and VIII. Hours per patient day by category in each pavilion, showing range within each category and number of patients and percent in each category, are also shown in table III.

Conclusions.—Patient classification results indicate that percentage in each category varies greatly from day to day. Highest percent of patients in maximum care were on medical area, moderate care on surgical area, and minimum care on private areas. Little differences in numbers within categories were seen on weekdays and weekends.

Nursing time requirements show wide variations in hours provided per patient. A progression in the amount of time required according to categories is shown, more care being required on weekends. Hours per patient day in Categories I and II showed little variation between the three areas. A wide range was shown in Category III and was much higher on the private area than the others. Total hours per patient day was lowest on the private service.

Recommendation.—Recommendations are • staffing patterns be adjusted by shift according to study results; • additional hours of care be provided medical and surgical areas based on 90 percent occupancy; • adjustments in staffing within services be made as averages vary; • periodic checking of patients by category be done; • further data collection on Category III patients be done to give more validity to hours of patient care needed; • further checklists on procedure sheet be made to determine types of personnel needed; • investigation of use of medical computerized system for reallocation of staffing form classification system be made; • recommend followup studies be done on staff utilization and quality control; • secretarial personnel be used to assist in tabulating results in further studies; and • further studies be done to compare differences in nursing care requirements on weekdays and weekends.

Critique

Nursing care requirements and staff utilization are frequent areas of study. Staff assignments made only on the basis of numbers of patients with no consideration given to patient care requirements have proved to be inadequate, often resulting in deficiencies or excesses in numbers and levels of personnel to care for the patients.

Moriconi presents two studies based on the CASH method that attempt to determine staffing requirements and nurse utilization in one hospital situation. A committee of 32 nursing personnel, all levels, provided consultation during the projects. The 1969 study is concerned with the assessment of nursing care requirements based on three patient need classifications (minimum care, moderate care, and maximum care) and nursing time requirements based on predetermined standard times required to perform specific nursing activities. The 1970 study on patient categorization and nurse utilization is in some degree a replication of the 1969 study. Nursing care requirements are assessed using the three categories found in the 1969 study with the addition of a fourth category, intensive care. The need for the fourth category was determined from the 1969 study. The procedure for development of this category is briefly described. The predetermined time standards, used in the 1969 study, are also used in the 1970 study. Nursing time requirements are studied to determine level of personnel required as well as total nursing staff requirements. These, the author states, provide information for the development of staffing patterns.

Definitions of Categories I–III are stated in very general terms and classify patients in relation to their nursing needs, dependency, observation, treatments, teaching and/or emotional. The fourth category names specific illnesses that indicate the patient is in an acute state of disability. Combinations of the four are not explained. The method used in classification of patients is only briefly discussed. It is assumed they were classified by the investigator.

The major portion of reporting is devoted to the analysis and reporting of data that are appropriate and concise. The theoretical frameworks of the studies are lacking, literature reviews are omitted, and premises are deficient or lacking. Development of tools and procedures is not described in most instances. Testing of instruments is not included. Samples of instruments are included in the appendixes. Development of standard times is only briefly described stating that they were determined by observations and timing of nursing procedure and compared to those given by the CASH study. Orientation procedures for personnel and observers involved in the study are omitted. The sample is adequate.

For the most part these studies report the data analysis and results that may be of interest to nursing administrators. The deficiencies in the reporting of these studies limit any specific contribution that could be made to nurse staffing design.

B24. Ryan, Jeanne E. "Staff Nurses' Opinions of Shift Rotation Methods." A Research Project submitted in fulfillment of the course requirements for Nursing 457, De-Paul University, Chicago, Illinois, March 1965.

Review

Purpose.—"The purpose of this study is to survey the opinions of the nurses at this hospital about the shift rotation they experience and to elicit suggestions for change that they think would be an improvement over the present nonstructured practice."

Hypotheses.—

"1. The majority of staff nurses are dissatisfied with the present rotation practices.

2. The majority of staff nurses will be unable to give suggestions for rotation systems that they think would be more to their satisfaction."

Method.—Thirty-four of the 69 full-time staff nurses assigned to patient care returned the questionnaire.

Opinion survey consisted of questions requesting demographic data and questions to be answered "yes" or "no" regarding staff rotation. No statements of reliability or validity are given. No pretesting was done.

Replies were compared with two preliminary surveys of staff nurses' opinions of rotation practices at VA done in the past 2½ years. All staff nurses were included in the first study, only those who rotated shifts on the nursing units were surveyed in the second study, and all staff nurses in the patient care units were surveyed in the present study.

Findings.—"The hypotheses that the majority of staff nurses were dissatisfied with current rotation practices and would be unable to suggest rotation systems more to their satisfaction were disproved."

Satisfied and dissatisfied groups of nurses appear to be similar in most personal and professional characteristics.

Marital status affects satisfaction or dissatisfaction with rotation problems. More staff nurses are rotating now than during a previous study. Staff nurses prefer to relieve on their own wards rather than float. Staff nurses prefer that the rotation of shifts and length of time be determined by the head nurse. Nonrotating staff nurses are on indefinite assignments for personal reasons. Resistance or reluctance of staff nurses to participate in surveys is evidenced by the number of incomplete questionnaires.

Critique

One of the major problems in planning for staffing centers upon the 24 hour per day requirement for staffing. The need to have nurses present during the day, evening, and night is obvious. However, the undesirability of evening and night assignments to personnel has become increasingly apparent. Present practice in hospitals to meet around the clock staffing is rotation assignments or straight assignments. This paper is concerned with the opinions nurses hold about the practice of rotation assignments.

The theoretical framework consists of a brief review of the literature. No reference is made to changes occurring within industry, to the literature dealing with circadian rhythm and human adaptation, to psychological literature on group identification. The study design is inadequate. There is no information about the development of the questionnaire and the testing of it for reliability and validity. The percent of staff returning the questionnaire is small.

In spite of its limitations, there are "hunches" from the study that could be explored further. These deal with factors that may affect the acceptance or rejection of assignments and how some of the negative features can be overcome. These factors must be consistent in any staffing plan proposed. Therefore, this study is indirectly related to methodology.

B25. Schick, D., and Wilczynski, J. "Nurse Utilization Study." No. 719-70. Ann Arbor, Michigan: Community Systems Foundation, (no date).

Review

Purpose.—To provide a staffing guide for determining the daily requirements for medical and surgical units. Manpower requirements are a function of patient needs and vary by shift and census.

To provide one objective analysis of hospital nursing activities so that workload can be adjusted during high and low activity hours to increase utilization and reduce cost.

To document the hospital's philosophy of nursing and to provide goals.

To provide a system of information feedback for measuring performance of each nursing unit.

Assumptions.—The time required per shift is equally distributed over each hour of the shift.

The study units were effectively managed and reflect a high caliber of nursing care.

Limitations.—The results are specifically applicable to adult surgical and medical units.

The personnel classifications are registered nurses, licensed practical nurses, and auxiliary personnel.

The results are a function of the degree of employee cooperation and participation.

The guide allows for personal, fatigue, and delay time but not sick leave, vacation, holidays or time spent in nonpatient related activities.

Direct care activities performed by members of the hospital volunteer program were included under auxiliary classification of personnel.

Procedure.—The four general steps of procedure were (a) initial orientation and planning, (b) development of direct and indirect care reports, (c) 1-day trial run, and (d) 10-day study.

Orientation and planning began with a meeting between representatives of hospital administration, of nursing service administration, and of CSF. A Nurse Utilization Program Committee, headed by a representative from nursing administration, selected a study site that best reflected the hospital's objective of management efficiency and patient care quality. Other criteria considered in the selection of the study unit involved the competency and cooperation expected from nursing personnel assigned to the unit and the ability to maintain an adequate staff. The program committee and the hospital coordinator identified frequently occurring nursing tasks and assigned them to direct care activity and indirect care activity categories. *Indirect care* is that care given to all patients, assumed to be "average" patients, on a medical-surgical unit. Examples of indirect care are narcotic counts, census counts, and paperwork. *Direct care* is nursing activity that applies to a specific patient and varies as a function of the condition of the patient.

Instrument.—The *Direct Care Report* was designed to determine the direct care activities, the classification of nursing personnel who performed the activity, and the actual frequency with which the activity was performed. A list of nursing procedures and an activity manual were given to the hospital coordinator to review and compare existing procedures. If a procedure differed significantly from standard procedure, the time standards were altered. The hospital coordinator selected 80 tasks that were expected to occur most frequently and assigned a potential nursing skill level to each activity. This potential assignment was a function of patient's condition and formed the basis for a Potential Staffing Guide.

The *Indirect Care Report* was designed to determine the indirect care procedures that are performed daily by nursing personnel, the classification of nursing personnel who generally perform the tasks, and the frequency per day the tasks are performed. The estimated frequency is obtained in interviews with the personnel at changes on all shifts. The indirect care estimate is the product of the frequency per patient per day times the predetermined time standard. These estimates are included in the staffing guides but do not appear in the Work Distribution or Activity Analysis.

Patient information data are obtained by using a clipboard attached to the patient's bed. All patients are given a written explanation of the study.

The Master List of Activities, which includes the potential skill level assignments of personnel, is a documentation of the hospital's philosophy.

Classification of patients was based on the characteristics regarded as most serious. If a patient was in complete isolation but otherwise a self-care patient, he was categorized as "complete care" patient (III). Ten complete care characteristics included complete bed baths; frequent deep suctioning; parenteral fluids; unconscious; marked emotional needs; vital signs, ordered over three per shift; continuous oxygen therapy; complete isolation; chest or abdominal tubes; and close observation for impending hemorrhage, etc. Among 10 partial care characteristics are oral or pharyngeal suctioning, parenteral fluids, semiconscious, slight emotional needs, vital signs ordered, and intermittent oxygen therapy. Four characteristics of self-care patients are self-baths, feed, ambulatory, to be discharged, surgery—not returned, and admitted—except emergency.

Procedure and result.—To check the quality of data collection, the recorded frequencies of eight activities are examined. Seven days that are most representative of the type and frequency of nursing care are chosen from the total sample of 10 days. Patient occupancy was measured by expressing the amount of time a patient was in a nursing unit in tenths of a day. Patients were categorized daily or more frequently if a change in condition was exhibited.

The census data by patient category for a 17-day study period for a total of 322.8 patient days were 52.2 percent self-care, 33.9 percent partial care, and 13.9 percent complete care. The average hours per patient based on available staff were calculated. The average hours per patient per day for all staff was 1.84 per day, 1.19 per evening, and .87 for night, totaling 3.90 hours of total nursing care per patient day.

The Observed Staffing Guides depict the nursing hours and are generated by multiplying the frequencies of nursing care activities by the time standards. The guides are divided by shift, patient, category, and employee skill level to illustrate the use of the guide as a basis for determining the staffing required for coverage during the 7 study days.

The Potential Staffing Guide is similar to the Observed Staffing Guide, except that the potential skill level is substituted. The study allows the hospital to indicate more than one skill level per activity. The total nursing man-hours per shift do not differ between the Potential and Observed Staffing Guides.

Charts are used to represent the total man-hours by skill level utilized at 1 hour of the day in performing direct care activities. "Highs" and "lows" for each shift for weekdays and weekend indicate the significant variations in workspace throughout the shifts.

The differences between the results reflecting the total man-hours spent doing direct care tasks at any one hour using the potential employee skill level and the observed work distribution appear in the skill level totals only. Redistribution in terms of the time of day these activities may be performed will often reduce staff requirements.

Bar graphs illustrate the observed work distribution required for each hour of the day for weekdays and weekend. The average man-hour per hour is determined for each shift. The goal is to redistribute tasks so that the near-optimum utilization of staff will be realized.

A list of work distribution ideas and procedures has been tested and successfully implemented. Examples of the 26 suggestions are: set up water at night, take BP same time as meds, supply lab work list at unit, reduce shift report by using tape recorders, and distribute sleep medications later to reduce "repeats."

Utilization of results.—The application of the study involves the initiation and utilization of the Staff Requirement Report. Weekly utilization and performance reports institute a mechanism for the appraisal of nursing utilization. An example of the Requirement Report and suggested procedure for use is presented. Instructions in the preparation of the weekly nursing utilization report and the semiannual performance report by week are explained. The Nursing Hours Report, the Comparative Report, and the Personnel Utilization Report should be sent to CSF if the hospital wishes to participate in a comparative reporting system.

Conclusions.—The development of staffing guides for medical-surgical units for an individual hospital has been accomplished. The remaining study objectives depend on the implementation of the Observed Staffing Guide, the Staff Utilization and Control Program, and a complete review of the hourly Activity Analysis.

Communications and cooperation between unit and administrative personnel should improve.

Daily planning and scheduling should reduce "peaks and valleys" within each shift and each day.

Improvement in staff balance, by skill level and shift, will allow personnel assignments to reflect the patient's condition.

Improved organization of daily work to simplify and standardize nursing procedures will reduce error possibilities.

These data will assist in planning budgets, provide topics for inservice presentation, give guidelines for recruiting and obtaining personnel, and be useful in future expansion as changes in configuration of nursing units occur.

Critique

In this study of the nurse staffing of a particular hospital, the authors utilize the approach to nurse staffing designed by the Community Systems Foundation. Therefore, the report is relevant to the subject of staffing methodology. It serves as a model of feasibility of the approach.

The appendix of the report is of special value, for it is there that the reader finds a description of the procedure, the forms, the criteria for patient classification, etc. The exhibits are in fair detail; some explanation about their use is included. However, although the method is described fairly well, one still must make some assumptions about the conduct of the study. No rationale is given for the approach. The sources of the predetermined time standards, the activity lists, and the criteria for classification are not reported. Neither is there evidence supporting the reliability and validity of the data.

The data collection was restricted to one study unit, medical-surgical, yet the authors state that "the results can be projected to other areas of the hospital (i.e., postpartum units, CCU, ICU, if we are cognizant of the fallibility in projections)" indicating that the authors believe the clinical dimension in patient care can be ignored.

The approach is feasible. Consultation help will be required because of the vagueness of the procedures. Adjusting staffing daily may be questioned, since it is cumbersome and staff reactions to moving may be strongly negative. How reliable and valid the staffing projection truly is remains unanswered.

B26. Snowhook, Gay; Ward, Charity; and Ramino, Katherine. "A Survey of the Hospital Administrative Functions of the Evening Supervisor." A Research Project submitted in partial fulfillment of the course requirement for Nursing 476, DePaul University, Chicago, Illinois, May 1963.

Review

Purpose.—To investigate the degree to which the evening supervisor performs hospital administrative functions in selected areas. Primary interest was centered in hospital administrative functions performed by her that were not usually executed by the nursing service personnel during the daytime.

Method.—The study was limited to selected general, non-Governmental hospitals of 150 beds and more in Illinois.

The descriptive survey research method was used and the questionnaire, multiple-type questions, was the tool elected to gather the data.

Of the 82 hospitals meeting the limitations established, 62 responded to the questionnaire.

Hospital administrative function was defined as an activity normally executed by departmental personnel other than the nursing service staff during the daytime.

"In order to develop the questionnaire and analyze the findings, specifically selected, nonnursing service departments within the hospital were utilized to concentrate attention upon the degree of the evening supervisor's hospital administrative functions, especially those performed by her that were not usually executed by nursing service personnel during the daytime." (No further discussion of questionnaire was included.) Nonnursing areas covered in the questionnaire included: administration, policy enforcement relating to the medical staff, employee health service, volunteer department, dietary, housekeeping, pharmacy, admitting and business offices, equipment and maintenance, laboratories, blood bank, public relations, and the medical record department.

Information from the tabulation tables is presented in graphic form according to each selected hospital area.

Data obtained from each questionnaire were tabulated according to bed capacity of the hospital, selected administrative areas, responses relating to administrative activity not included in the questionnaire, and responses not fitting into selected areas.

The bed capacity of the hospitals was divided into class intervals of 100.

Findings.—The investigation showed that the evening nursing supervisor's hospital administrative functions decrease as the bed capacity of the hospital increases.

- Evening nursing service supervisor has been delegated certain hospital administrative functions because of the nature of her position.
- She is the highest ranking administrative person

on duty in the majority of all hospital sizes queried.

- She is responsible for seeing that hospital policy is observed by the medical staff.
- Evening nursing supervisor emerged as the "hospital administrator" because she is within the institution.
- Evening supervisor is not responsible for orienting volunteers during the evening.
- Majority of the evening supervisors did not function administratively in dietary.
- Size of the hospital shows a definite relationship with the evening supervisor's administrative functions within the department of housekeeping.
- Supervisor does have administrative functions within the pharmacy after 5:30. These functions are directly related to size of the hospital.
- Evening nursing supervisor had a strong degree of hospital administrative functions within the admitting office and a minimal degree connected with the business offices. The larger the hospital, the less responsibility existed.
- Supervisors have a high degree of hospital administrative functional responsibility concerning equipment and maintenance.
- Supervisors had no hospital administrative communications with laboratory, X-ray, and blood bank technicians except in the smallest hospitals.
- Evening supervisor was delegated the function of speaking for the institution in all categories. There was a size relationship in area of public relations.
- Supervisors are delegated hospital administrative authority to function in area of medical records.
- Evening supervisors in the larger hospitals have hospital administrative functions concerning an employee health service.

Critique

The majority of staffing methodologies focus upon nurse staffing of nursing units and state that the determination of nursing administrative positions is a matter of local judgment. One of the large questions about nursing administrative positions is that about the role of the house supervisor assigned to the evening and night hours. *The Survey of Nursing Services* (1964) published by the NLN reported that the Department of Nursing Services carried a number of hospital administrator's functions, especially in the evening and at night. This study concerns itself with the identification of these functions in hospitals in Illinois. The study is included in this review to illustrate an approach to the study of functions of this level of nursing personnel.

The research is limited primarily by its failure to include a description of the development of the questionnaire, the lack of evidence pertaining to it for validity and reliability, and the simplicity of the analysis of the data. The sample size is adequate and the number responding is adequate. The report's usefulness lies in the fact that the questionnaire could be further developed and used in a larger study. The question of the role function of house supervisor's is pertinent and highly related to cost of nursing staff and effectiveness of staff. No general guidelines presently exist for her functioning.

B27. Steiner, Mathew W. *Main Nursing Study*. No. 6-63. Ann Arbor, Michigan: Community Systems Foundation, December 1963.

Review

Purpose.—This study was undertaken by a committee composed of administration, nursing, and industrial engineers to evaluate the activities of nursing and recommended changes that would benefit the management of a nursing unit and nursing utilization in a particular hospital.

Method.—The area selected for study was a medical-surgical nursing unit with an average daily patient census of about 45. A work sampling program was utilized as the method of data collection. Eighteen categories of observation were decided upon by the committee. These categories were then divided by the committee into five groups representing distinguishing levels of personnel utilization. These groups were: • direct patient care, • indirect patient care, • personnel, • service, and • personal. (A sample is included in the appendix.) Before actual data collection was begun, an orientation period was held for the observers, consisting of numerous lessons in use of the forms necessary to conduct the study and to classify categories. Observers were also taken to the floor where actual practice in observing was conducted.

Personnel being observed in the study were acquainted with the objectives of the study and how it was to be conducted. They were also interviewed personally to find out their duties and complaints. Summary job descriptions were devised based on a questionnaire completed by all these individuals. (A sample is included in the appendix.)

The actual study encompassed all three assignment shifts and ran for 3 weeks. A total of eight observations per hour were made on an individual studied. Two observers were employed on the first shift and one observer was employed on the second and third shift.

The overall results of the work sample are shown in the appendix. This reflects the individual type nursing personnel contributions to the total nursing personnel output.

Results.—The sampling data indicated certain areas that could be looked into by the committee for methods improvement. These areas were the clinical activities of registered nurses, the time spent in charting, and the amount of time spent in preparing and giving medications. The effect that students have on normal staff is also shown. With students present, the time spent in direct patient care was increased, while other activities, such as housekeeping, were down. In order to provide a consistent level of nursing care, with or without students present, a minimum staff, when students were present, was established.

Although, according to the committee, work sampling will indicate the quantity of nursing care being given, it cannot measure the quality. It remains a nursing decision to judge whether or not the quality is adequate.

According to the committee, fixed elements in terms of availability and not dependent on the work sampling result were the average census for a particular day and shift and the number of nursing hours available for a particular day and shift. (This conclusion was based on data from a 6-month period preceding the start of this study.) To overcome these variables, it was decided to establish cyclical scheduling. This would provide the tool necessary to control nursing hours per patient and allow sufficient time to adjust the nursing staff at such times when the census would be expected to drop.

Recommendations.—The recommended staffing for the unit for the three shifts was as follows:

- First shift:
  - without students—three registered nurses, three licensed practical nurses, and three nurse aides.
  - with students—three registered nurses, two licensed practical nurses, and two nurse aides.
- Second shift: two registered nurses, two licensed practical nurses, and two nurse aides.
- Third shift: one registered nurse, one licensed practical nurse, and one nurse aide.

Other recommended changes to increase nurse utilization and benefit management brought about by the study were as follows:

- A new medication procedure involving elimination of the kardex and institution of new medicine record was developed. Methods of reordering drugs and of preparing medications for patients were devised.
- A plan was drawn for the rebuilding of the nurses' station to eliminate congestion and offer maximum efficiency for the nurses and ward clerks who did their work in this area.
- Plans were developed for the best utilization of space and easiest accessibility in the medicine room and utility rooms.
- Nurse aides were trained to chart temperatures.
- New charging procedures for CSR and new routine for CSR and laundry distribution were implemented.
- Ward clerks were trained in transcribing doctors orders.

The unit manager concept was reviewed by the committee but was rejected as they felt that the concept seemed premature and redundant for use at this time.

Critique

This study, conducted in a particular hospital by a consultant from CSF, uses a different approach from that taken for other studies by that group. The author is concerned about measurement of nursing activity, census variation, and assignment of staff. The study, therefore, is related to nurse staffing methodology.

Prior to conduct of the work sampling portion of the study, the author was instrumental in determining facts about census and staffing variation. This and a compilation of problems and complaints expressed by the nursing staff served as the backdrop of the study itself. The method employed work sampling, interviews, diagrams of physical plant layout, review of supporting systems, and descriptions of position. The worksheet used to collect data is included and easily reproducible. No description of the development and testing of these is included. Observers were oriented, but the training program and tests of agreement are missing. The data sample appears adequate. It is carefully reduced to percentage of time; the tabulation is detailed.

The approach apparently is feasible. The recommendations are based on data. The author states explicitly that quality determination of nursing practice is a matter of nursing administration responsibility. One wishes in reading the report that it was more comprehensive and included rationale, assumptions, and evidence of reliable and valid data. The approach is logical; many variables are considered in arriving at the recommendations. In this respect, the study is excellent.

B28. Steiner, Mathew W., and Crane, Keith. "Nursing Station Activity Study." No. 76-64. Ann Arbor, Michigan: Community Systems Foundation, June 1964.

Review

Purpose.—This study focuses upon the placement of task responsibility between nursing and clerical personnel.

It was felt that the floor clerical personnel were not being utilized to their capacity and may be performing tasks contrary to their purpose.

The purposes of the desk clerk are outlined:

(a) to relieve nursing personnel of certain tasks that require no training in patient care and will result in an economic saving,

(b) to act as a communication link between the floor nursing staff and administration, medical staff, ancillary departments, visitors and the nursing staff themselves. Improved communications, it is felt, will result in improved patient care.

Method.—The study was begun May 15, 1964, and was completed June 26, 1964. Questionnaires were filled out by desk clerks, head nurses, and other selected floor personnel, listing all clerical duties they performed (or could have performed at the nursing station if time and space permitted), as well as a daily time estimate for each tour of duty. This information was compared to job descriptions of nursing personnel for appropriateness of placement and compared between nursing units for consistency. Numerical time estimates were not considered absolutely accurate.

Results.—Head nurses felt they were spending more time in the nurses' station than the desk clerk was.

Activities that removed the desk clerk from the nurses' station were checking and passing trays (40 minutes per day, 7 a.m. to 3:30 p.m. shift), passing water, passing nourishments, conversation with patients, escorting admissions and discharges, cleaning medicine and tray rooms, and messenger tasks. Those are referred to as "fill in" tasks.

The tasks that were found to tie the head (or charge) nurse to the desk 140/minute/per day shift were noting doctors' orders into kardex and transcribing them onto drug requisitions, CSR charge slips, medicine and treatment card, etc., also making out drug orders, and refunds.

Recommendations.—Redelegation of tasks was recommended on the basis of the findings, and new procedures were outlined for:

- Tray checking. To relieve the clerk of checking trays, it was recommended that the clerk prepare daily diet census sheet (prior to the evening meal) and submit to dietary any meal changes for breakfast and lunch in writing or by telephone.
- Drug refunds. When making out discharge slips for the patient, the clerk could also check the patient's medication information. If there were left over medications, the clerk could stamp the pharmacy requisition and check it as a "return for credit," and also include a list of medications. This should be checked and signed by the nurse at the same time.
- Drug reorders. When the team leader inspects the patient's medication for reorder, a list could be given to the clerk who could stamp the requisition, refill orders, enter the name of the drug, and check the kardex to enter proper dosage, time and route. This was to be checked by the nurse

when doctors' orders are checked and relieve the nurse of making out pharmacy requisitions for reorder.

- A completely new procedure for noting doctors' orders was developed, to be executed by the desk clerk. This was done since the procedure was thought to be a mechanical process. A checking procedure for the nurse is also included.

A revised clerical job description was written on the basis of the study results. A copy is attached to the study.

Changes in procedures were instituted to utilize the clerks "fill in" time, to relieve professional personnel of duties in the station, and to enable the clerk to function purposefully as the communication link for the unit. A messenger service was recommended to relieve the clerk of running errands that would take her away from the station. Reassignment of duties previously done by the head nurse to the clerk allowed the head nurse more time to spend on the unit.

Critique

The amount of clerical support provided nursing on nursing units undoubtedly influences the amount and type of nursing staff required. Furthermore, the knowledge and skill base necessary for performance of clerical tasks differ from that usually provided nursing personnel to care for patients. This study of the clerical tasks carried by nursing and the patient services carried by clerks was conducted to separate out the work of the two skill levels to provide better interfacing of the two groups.

The report was prepared for an administrator of a specific hospital. It outlines the purpose of the study and the general approach. However, since the questionnaire used for data collection is missing and there is no reference to the total number of respondents, the soudness of the method cannot be evaluated. The steps in the procedure, as outlined, do make sense. These could be expanded into a precise approach.

B29. Veterans Administration Hospital, Iowa City, Iowa, Nursing Study Committee. "A Study of the Utilization of Nursing Service Personnel at Veterans Administration Hospital, Iowa City, Iowa," (no date).

Review

Purpose.—"This study was conducted to obtain information which would serve as a basis for evaluating the utilization of personnel within Nursing Service at the Veterans Administration Hospital, Iowa City, Iowa."

(a) "Find out according to position classification and grade of nursing personnel: What activities are being done? When are these activities being done? Where are these activities being done?"

(b) "Determining the appropriateness and/or inappropriateness of the activities."

Method and sample.—Twelve of 14 ward nursing units at the VA Hospital were studied for 2 days. The sample consisted of 21 activity sheets that were randomly selected from all the activity sheets.

"Data were collected in 5-minute time units, using the work diary method, on 12 of the 14 nursing units on 1 weekday and 1 weekend day."

Instruments.—The methods and tools used in this study are described in the VA Program Guide 7, M-2, Part I. A patient Census and Supplemental Data Sheet were devised to record pertinent information that influenced the workload on each nursing unit.

The Reliability Test for Coders suggested by the Program Guide was modified and duplicated. The criteria for selection of coders are not mentioned in this report. These individuals helped in the simplification of the Activity Classification Code. These 15 potential coders and six members of the Nursing Study Committee agreed with the standards 85.5 percent. The agreement between the first and second test was 87.5 percent. The group of 16 who established this type of reliability were comprised of 11 professional nurses, two nursing assistants, two social workers, and one dietitian.

The criteria established for selecting individuals to serve as members of two juries who would be asked to judge the appropriateness of activity are not included in the report. Jury I was composed of 36 professional nurses, 16 staff nurses, five clinical teachers, five head nurses, eight supervisors and two directors selected from three health care agencies in Iowa City. The three agencies were a church affiliated general hospital with a school of nursing, a State approved general teaching hospital, and one college of nursing.

Jury II, of 45 individuals, was comprised of specialists outside the health field, chiefs of hospital services and divisions of this facility (VA), and professional nurses. There were 15 nurses, 15 chiefs of divisions and services, and 15 citizens from local agencies. The citizens from local agencies are described in terms of the field of occupation and the name of the local agency. The nurses and chiefs of divisions and services are described in terms of years of experience and the service they represent.

Procedure.—Personnel on all three shifts were instructed on the use of the activity sheets. One hour class sessions were held with groups of 1 to 18 employees. Following a trial run, further instruction was given personnel about problem areas of recording. Data were collected on a Sunday and a Thursday.

The procedure used to categorize nursing activities was based on the determination of appropriateness by Jury I (group of 36 professional nurses). The activities that were judged inappropriate or questionable were given to Jury II (group of 45 individuals selected from agencies within the community). "Inappropriate or questionable activities and those which did not meet the 75 percent consensus of agreement were used to develop an activity list for Jury II."

The activity statement; the number of nurses in various positions; deciding appropriate, inappropriate or questionable activities, and the percent agreement over 75 percent are presented in the appendix. Also, verbatim comments by the judges are included and presented according to activity number. The specialist's (Jury II) judgment on reallocation according to department and job title is presented according to activity number.

Findings.—The activity sheets were tabulated. During the weekday study there were 20 additional workers on the day shift, six on the week evening shift, and three on the night shift over the personnel on duty on Sunday. The basic staffing pattern on the 2 study days was one professional to one nonprofessional nursing person. On the psychiatric service, there was a ratio of one professional to three nonprofessionals over a 24 hour period. "This assessment suggests that the nursing care requirements of all patients were infinitely greater than the time available on the survey days." There were 564 more activities recorded than expected. "This represents a total of 47 hours overtime on the two survey days." Direct care, indirect care, and coordinating institutional services accounted for 76 percent of time for all nursing personnel. Over half the time spent on direct care activities was spent providing physical care and administering or assisting with treatments, tests, or medications. Over 60 percent of the time expended in providing indirect care was spent communicating between ward unit nursing personnel. Coordinating housekeeping, food service, and clerical accounted for 92 percent of the time spent in coordinating services. The author states no conclusions can be drawn regarding the time spent on each subcategory of nursing activity according to position and/or grade of nursing personnel. However, a chi-square test was used to determine the relationship between direct and indirect nursing activity with head nurse or staff nurse position. The results of this one example show that the position of professional personnel had no effect on the time spent on direct and indirect care.

The activities were judged appropriate or inappropriate by use of a jury. Jury I judged 60 activities as appropriate and 16 as inappropriate. The highest level of agreement on activities concerned giving direct and indirect patient care. The inappropriate activities involved cleaning, errands, and clerical tasks. Jury II judged nine activities as appropriate and three as inappropriate. A below average ratio of agreement was found to exist between the professional nurse and each of the component groups in Jury II.

Critique

One of the approaches to the study of nursing utilization is that developed by the VA. This report is a study making use of that approach. The steps were carefully followed as suggested in the VA Program Guide 7, M-2, Part I.

The data described in the report, although the criteria for selection of coders were not reported, are reliable since agreement between coders and the standards set was high, 85.5 to 87.5 percent. Great care was taken to conduct the study as outlined in the protocol.

The value of this study lies in its serving as a model showing the application of a specific approach to nurse utilization studies. As a result, changes were made to transfer some functions to other departments. The study indicates that the approach is feasible, forms reproducible, and that it can be used for the purpose intended.

B30. Wase, Gordon M.; Feurer, R., and Pyle, D. "A Nurse Utilization Program." Ann Arbor, Michigan: Community Systems Foundation, December 1968.

Review

Purpose.—This report contains the results of the Nursing Utilization Studies conducted by CSF at Fairfax Hospital, Falls Church, Virginia. Objectives of the study were to (a) provide a staffing guide for medical-surgical unit, (b) illustrate the workload distribution so as to assist in the redistribution of nursing activities to provide for a more even workload, (c) utilize professional raises at their most effective level, (d) reduce cost of hospital operations, and (e) improve patient care.

Method.—Before the utilization program was begun by CSF personnel, an orientation meeting was held for all hospital employees who would be directly involved with the study. At this time, CSF personnel were made knowledgeable about the nursing philosophy and hospital policies. The hospital appointed a committee to assume responsibility for the overall supervision and functioning of the study program.

A medical unit and a surgical unit were chosen for the study. According to the hospital committee, these units best reflected efficient management and a high standard of patient care.

The major tools used in data collection during the study were the Basic Care Report, the Special Care Report, and a Classification of Patients form. Daily census records were also kept.

Basic care as defined by CSF is that level of care given to all patients regardless of their condition and assumes an average patient on a medical-surgical unit. The Basic Care Report is a tool designed by CSF and is a list of 24 basic care procedures performed by nursing personnel, each procedure having a time standard. The standard time established by CSF represents the time it takes an average, experienced employee, using an acceptable method, to perform the procedure with allowances for personal, fatigue, and delay. The Basic Care Report is designed to determine the classification of personnel performing the basic care and to obtain the daily frequency that the procedures are performed. A sample of the Basic Care Report appears in the appendixes.

Special care is defined by CSF as including those nursing activities that apply to a specific patient but are not necessary to all patients. A representative list of 145 special care activities was compiled by the CSF project committee and time standards determined. A sample of the Special Care Report appears in the appendixes.

The Classification of Patients form adopted for the program allows for patients to be classified into one of three categories: Category I—Self Care; Category II—Partial Care; and Category III—Complete Care. Patient classification is accomplished by determining what characteristics apply to each patient from the criteria given. The characteristics that are "most serious" determine the patients' classification. The number of hospital personnel completing this form was limited in order to maintain objectivity. The criteria for patient classification are given in the appendixes.

The authors do not describe in the study how the Basic Care Report, Special Care Report, and Classification of Patients form were developed nor do they make any statements concerning the reliability or validity of these tools.

Before the actual study was begun, CSF personnel conducted several sessions with personnel on the various shifts to explain the purpose of the study and the role of personnel in the study. Each employee received written instructions, and 1-day trial runs were conducted. Employee participation was necessary for accurate data collection.

Data were collected over two 7-day periods for a total of 422.9 patient days in the first unit and 279.5 patient days in the second unit. This represented an average daily census of 60.4 and 39.9 patient days respectively.

The following guides and reports are the results of the study (samples of all are included in the appendixes).

- Actual Staffing Guide. This depicts the nursing man-hours required for a "typical" medical or surgical unit at Fairfax Hospital. It was developed through determining the total time required to complete all basic and special nursing care activities for all patients on the units and is described by shift, by patient category, and by employee skill level. The guide's purpose is to assist the head nurse in determining daily staffing requirements but, the authors contend, it does not replace judgment, experience, and common sense. The Actual Staffing Guide appears in the appendixes. Utilization of the guide is described and examples are given.

- Recommended Staffing Guide. Each hospital was asked to review the nursing activities on the Special Care Report and indicate which nursing personnel level should be accomplishing each activity. The study allowed the hospital to indicate more than one skill level per task but not more than one per category of patient. The recommended skill levels were then substituted for those who actually performed the activity during the study creating the recommended guide.

By comparing data from the actual and recommended staffing guide the following changes were suggested:

Unit I—day shift. Decrease registered nurse hours and increase auxiliary man-hours. Evening and night shift: reduce registered nurse hours and increase licensed practical nurse and auxiliary hours.

Unit II—day, evening, and night shift. Reduce registered nurse hours and increase significantly licensed practical nurse and auxiliary hours.

- Accumulated Hours—Actual. This is an accumulation of all the nursing hours doing special care tasks during the study and is expressed by personnel skill level and hour of day.
- Accumulated Hours—Recommended. This is an accumulation of all nursing hours for special care tasks during the study but has been constructed by substituting the recommended personnel skill levels for each special care activity.

A comparison of the actual and recommended accumulated hours again suggested the need for markedly reducing registered nurse time and increasing licensed practical nurse and auxiliary time.

- Actual Work Distribution—per day. This represents the total man-hours by skill level utilized at any one hour of the day doing special nursing care tasks. Peak workload periods for Unit I were identified as 10 a.m., 5 p.m., and 6 a.m. and for Unit II, 10 a.m., 9 p.m., and 1 a.m. Low periods were 1 p.m., 11 p.m., and 1 a.m. for Unit I and for Unit II, 3 p.m., 11 p.m., and 5 a.m.
- Recommended Work Distribution. This chart reflects the total man-hours spent doing special care tasks at any one hour of the day but by the employee skill level as recommended by the hospital nursing service.

A program for utilization of the above guides and reports is described by the authors in the study. Utilization includes a Staff Requirement Report, a Weekly Nursing Utilization Report, and a Weekly Performance Report. (Samples appear in the appendixes.)

- Staff Requirement Report. This report will assist the head nurse in determining the approximate staff requirements before the start of each shift based on the estimated needs of each patient. This report utilizes the Staffing Guide.
- Weekly Nursing Utilization Report. This report is designed to provide a weekly management control for each nursing unit and to assist in determining how well nursing units are being staffed in accordance with patient needs. This report compares daily nursing hours required for each shift with actual hours worked.
- Weekly Performance Report. This report is a visual plot of the weekly Utilization Index recorded on the Nursing Utilization Report. Understaffing and overstaffing can be readily identified when the index falls above or below control limits.

As a final result of the study analysis, the authors list 50 suggestions for change within the two units that they feel will assist this hospital in meeting the objectives as outlined for improved utilization of nursing personnel and time and for improved patient care.

Critique

This report is the result of a 7-day study conducted in one hospital in Virginia by consultants from the Community Systems Foundation, Baltimore, Maryland. This group is a part of the organization established at Ann Arbor and the approach represents a modification of that by CASH.

This report by Wase, Feurer, and Pyle is relevant to the review of literature for two reasons. First, since it is well written, it provides an excellent picture of the approach. Second, it clearly states limitations "to be imposed to retain consistency in results" (p.2). In this respect, it does differ from the study by Schick and Wilczynski and others of the CSF group. For example, Wase, Feurer, and Pyle state that the results are applicable only to a medical-surgical unit; ward clerk activities were excluded in the study; and all activities performed by individuals undergoing on-the-job training were excluded.

The sampling period was short, 7 days; however, the sampling was larger in that two units were used instead of one. The sample appears adequate. There are serious questions about other features of the study. For example, the rationale underlying the approach is missing. There is no evidence that the tools provided reliable and valid data. There is a short sentence about restricting the act of classification of patients to too few personnel "to produce objectivity," but no information is given about selection or training of the classifiers, or their agreement on its use, or the derivation of the scheme itself. Sources of the predetermined time standards and the forms are not given. The forms are reproducible, but the special care report is lengthy and the tasks are not organized for fast easy recording.

The approach is feasible; it can be carried out. The staffing guides are developed from the data and their use explained. The recommendations are clearly stated. Whether or not the approach is sound is a fundamental question. Whether it is acceptable is another. The data used for evening reporting were reduced to that acquired in 4-day periods because of "lack of cooperation" of the personnel.

B31. Wetzel, Erwin J. "Discharge Orders and Their Effect on Processing Vacated Patient Units." A Research Project submitted in partial fulfillment of the course requirements for Nursing 457, DePaul University, Chicago, Illinois, February 1967.

Review

Purpose.—A survey was conducted to gather data pertaining to the administrative and procedural actions and time factors that are set in motion when the physician writes the order for discharge for one of his patients. The purpose is fourfold: to determine the daily number of patient losses from the nursing units, to determine date that the physician's order for discharge was written, to determine the effective date of the discharge, and to determine the number of discharges who did not depart from the hospital immediately but waited for a member of the family or friends to come to get them.

Methodology.—"The method of research for this study is a normative survey." Data were obtained from the clinical records of the patients and nursing service personnel on the respective units. The questionnaire obtained information concerning the discharging of patients, the date on which the physician wrote the discharge order, the effective date of discharge, and other related data. (A copy of the data collection sheet is included.) Questionnaires were distributed to ward clerks for two consecutive work weeks, Monday through Friday. "Patient loss" is defined as "a records term under which heading is recorded every patient departure which reduces the ward patient population."

Findings.—The total number of "losses" was 270. Of this number, 210 were discharges that were initiated by the patients' physicians.

Orders were written on the day of discharge for 125 patients. On the second or more days prior to discharge, only 12.8 percent of the discharge orders were written.

Of the total discharges, 155 were sent to clear before noon. (The secretary initiates the clearing procedures.)

Of all discharges, 79.43 percent left the hospital directly after completing the clearing process.

Of 210 discharges, 65.59 percent were discharged to Post-Hospital Care Program.

(This report includes no statistical measure of significance.) Data is presented in the form of tables and illustrations.

Critique

In the prediction of nursing requirements, census very often is used as a major variable. It is viewed as one of the major factors influencing workload. However, one variable influencing census is impact of time and frequency of the discharge of patients.

Work for nursing, housekeeping, and clerical personnel is generated by discharge orders. The time at which the patient departed also influences other work occurring concurrently at the time of discharge. This study, therefore, is directly related to staffing in that it considers the effect of discharge upon the measurement of nursing load.

The study is restricted to one setting and is a problemistic search for answers. The data asked for in the brief questionnaire were very specific. No check on the reliability of the data that was obtained from recordings made by clerks was conducted. Neither was there a determination as to whether or not the sampling was adequate in numbers. The problem is poorly conceptualized and its articulation is inept.

The value of the study lies in its being an example of how data were sought to describe the impact of discharge and the time it occurs on the work of nurses and supporting services.

C. Guides, Manuals, and Pamphlets

C1. American Nurses' Association. Committee on Nursing Services. "Statement on Nursing Staff Requirements for In-Patient Health Care Services." New York, New York: American Nurses' Association, March 1, 1967. (Mimeographed.)

Review

"The American Nurses' Association does not recommend any specific formula ratio or numerical concept that could be applied generally to any inpatient health care facility because of the multitude of factors that must be taken into consideration for each situation in determining staffing needs."

Four standards serve as the basis for planning amount and kind of staff required. These standards outline the responsibility and role that the registered nurse assumes in promoting safe and therapeutic care to patients.

Decisions for staff are made in accordance with amount and kind of patients, the span of supervision one nurse can provide for auxiliaries, and the amount of time she herself will spend in direct nursing care.

Consideration is given to 14 other factors influencing staffing.

Critique

This statement is distinctly related to nurse staffing. It refers to the *Standards for Organized Nursing Services* published by the ANA and, in particular, calls attention to specific assessment factors. This brief statement is well written. It is useful as a guide for decision making by the director of nursing services.

C2. Commission for Administrative Services in Hospitals. *A Quality Control Plan for Nursing Service.* 3345 Wilshire Boulevard, Los Angeles, California, 1965.

Review

Purpose.—To develop a plan for reporting on the quality of care given.

"Trained professional personnel may be one of the most effective means of detecting *gross* nursing deficiencies by direct inspection of both the patient and his immediate environs."

"Careful and critical review of patient records on the nursing unit can form a valuable supplementary source of information regarding nursing proficiency."

Objectives.—

"1. To provide a *measure* that will indicate the level of the quality of care and service, the *degree* of nursing proficiency.
2. To provide such measures on a *continuing* basis as a vital ongoing management *control.*
3. To provide *feedback* in order to allow the necessary corrective action.
4. To provide a means of establishing staffing patterns based upon *optimum* personnel *utilization* and *assured quality* of care and service."

Sample.—"It is the result of considerable research and pilot study by the nursing professionals in a number of our major hospitals in southern California, working in a cooperative effort with the consulting engineers with the CASH program."

Instrument.—A list of meaningful attributes to test the hypothesis[1] was developed by members of the nursing profession. "The means employed to carry out the tests were designed by engineering professionals."

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[1] "Hypothesis" singular is written in the review as shown in the study.

The statistical quality control is based upon the laws of probability. Three rules that must be followed are random sampling, a sufficient number of observations, and the attribute being observed must reflect the immediate condition.

Procedure.—Three quality control checksheets are used to observe the patient and his immediate environs, the patient chart and the nursing unit. Five of each of these checklists are needed in a 1 or 2 week control period.

It is recommended that nursing administration or supervisory nurses observe and rate the patient environment. Staff nurses are used to inspect and rate the patient chart. A procedure is outlined to enable the checksheets to be completed.

To insure validity of the Unit Quality Index, each nursing unit must provide a sufficient number of samples. This is done by increasing the number of samples required for the less acceptable units (acceptable on the basis of percent of positive ratings).

Supervisory nurses should review results. The quality control indices should be plotted on a Nursing Performance Report for each nursing unit. This provides a graphic picture of utilization and quality control and whether the indices are within the established control limits.

Results.—A technique that indicates the level of care and service within the parameters of the plan.

Critique

This publication contains the description of a program for quality control based on the initial work by Mark S. Blumberg, M.D., and Jacqueline Drew, R.N., entitled "Method of Assessing Nursing Care Quality." The booklet contains a description of the various elements of the plan and the procedure for the use of the forms. It is a brochure that is used by consultant engineers in explaining the program to hospital administrators and to nursing groups working with them.

There is no explanation of the selection of items used as indicators of nursing quality. It contains no detailed information about the training of observers.

The manual itself is poorly written in that the procedures are not clear and lack the elaboration necessary to give the contents meaning. One can not follow the manual and carry out the procedures without assistance from the consultant group or without some understanding of industrial engineering methodology.

C3. Commission for Administrative Services in Hospitals. *Nursing Procedures Manual.* 3345 Wilshire Boulevard, Los Angeles, California, January 1968

Review

This manual is designed to provide a basis for checking the time standard for each procedure; to review possibilities for improvement if a time variation exists; and, if necessary, to reestablish a time standard.

The time standards are based on direct observation time using engineering techniques. The standards include time to check the doctor's orders, wash hands before and after the procedure, obtain and dispose of equipment, identify the patient, explain procedure to the patient, raise or lower the bed, and charting. An allowance of 20 percent is allowed for personal time, such as coffee breaks; fatigue, as shown in slowing down toward the end of the shift; unavoidable delays, such as waiting for equipment; and minor unmeasured activities that interfere with normal procedures.

The recommended procedure for using the manual is for the nursing group to make a cursory check of major procedures and to compare the actual time spent with the time standard. If the actual time is significantly higher than the standard time, they then review and implement the suggested method of performing the procedure. If the time standard still is too low, the method used should be reported to the CASH consultant.

The bulk of this manual is devoted to the explanation of the purpose and procedures of 138 nursing activities. Examples include the following:

- Ace bandage application—.075 hours. Purpose: to give support and apply pressure over various veins of the extremities to control hemorrhages. The procedure for ace bandage application is to position patient in a comfortable position, anchor bandage leaving distal end exposed to check circulation, use spiral turns with even pressure, observe for signs of circulation impairment, change bandage daily, observe frequently, and wash hands.

- Bath, shower—.200 hours. Purpose: to cleanse the patient. Procedure: accompany patient to shower with necessary equipment, explain regulation of water and use of emergency bell, check with patient periodically, return patient to room, leave patient comfortable, remove all soiled linen, and leave shower ready for next patient.
- Feed, snack—.133 hours. Purpose: to provide adequate nutrition and meet individual need of patient. Procedure: check diet order, feed nourishment slowly, and teach principles of diet plan as pertinent.

Critique

This manual serves as a basic reference in the CASH staffing methodology. It explains how time standards for the major procedures were established, using standard engineering techniques. However, no references are included to support the methodology and its application and no statement is made about the sampling data upon which the standards are based.

The nursing procedures are written with a statement of purpose and steps involved in accomplishing that purpose. Only the skeletal points are included. However, the description appears to be in enough detail so that a nursing staff can judge whether or not the procedure is in agreement with that existing in their hospitals.

C4. Commission for Administrative Services in Hospitals. *Staff Utilization and Control Program Orientation Report, Medical/Surgical.* (Revised), 3345 Wilshire Boulevard, Los Angeles, California, December 1967.

Review

Location.—"The Staff Utilization and Control Program for Nursing Services has been developed, tested, and implemented by the cooperative effort of nursing personnel representing the majority of the short-term general hospitals in Southern California, and the management engineers of the CASH program."

Purpose.—"The primary objectives of the program are (1) to establish standards of personnel performance and quality based upon the requirements of each individual hospital, (2) to implement the standards of performance and quality by the application of modern management procedures, and (3) to provide the controls necessary to measure, on a continuing basis, the level of performance and quality achieved by each nursing unit."

Methodology (outline of program).—(a) Nursing supervision will participate in recording the necessary information for each medical-surgical unit on the Nursing Standards Data Report. The report is designed to document the procedures performed by nursing personnel, the frequency of performance, and the average standard nursing hours required for each patient each day. Nursing hour requirements are established through application of this Nursing Standards Data Report. This report presents those nursing procedures that may vary in frequency of occurrence from one hospital to another. Each procedure is followed by a time standard that has been established by extensive time studies. Each time standard represents the time needed for an average, experienced employee with allowance of personal time to perform the procedure. The report indicates the percent of patients that normally require a certain procedure and the usual frequency based on the averages of all CASH hospitals surveyed.

An evaluation of an individual hospital is made to determine if the indicators printed on the form compare favorably with the specific hospital in regard to nursing time requirements (this evaluation is not explained).

(b) CASH will develop daily staffing tables and personnel guides for each unit based on information from Nursing Standards Data Report. The Daily Staffing Hours Table is designed to allow nursing supervisors to determine the approximate staffing hours requirements for each shift, before the start of the shift, based on the total number of patients. Upon determination of total hours, including the head nurse's census predictions, the ward clerk selects the corresponding range of staff hours as printed on the guide.

(c) CASH will provide weekly control report forms to allow nursing to measure level of performance by unit. This weekly report is designed to provide a weekly management control for each nursing unit. In addition all unmeasured (nonproductive) time is recorded for analysis. This report is a graphic representation, intended to be seen by all unit personnel.

(d) CASH will publish monthly personnel performance reports to each participating hospital to provide the administration with information. This report is compiled by CASH and sent to the hospital.

(e) For those hospitals requiring additional analysis in order to comply with standard staffing, nursing will review the CASH procedures manual "to detect *significant* differences that may exist between actual practice and the indicated procedure." CASH and nursing will review the list of work distribution possibilities to determine those activities that can be performed at different times of the day. CASH will assist nursing in the conduct of a charting and clerical activities analysis that is designed to reduce charting time. CASH will assist nursing to reduce nursing department's responsibility for duties that are considered to be nonnursing. Three separate CASH case study reports (Shift Report, A Mobile Medication Tray Procedure, and Improved Nursing Notes Procedure) should be reviewed to determine their applicability for each hospital.

(f) "For those hospitals requiring additional analysis due to major patient care differences in nursing practices, a detailed survey of actual procedures performed may be made. CASH will collect and summarize patient care activities for 10 days and make a detailed analysis of the results."

Critique

This is an outline of the program for nursing, medical-surgical, proposed by CASH and revised in 1967. It is an attempt to enable *each* hospital to determine its own staffing requirements based upon patient classifications, procedures performed, and variations in policy and procedures. CASH, in turn for payment, provides a set of reports that can be used for controls, performance levels, and Nursing Staff Utilization Reports.

The objectives, forms, steps in the procedure, and samples of calculations are included in the manual.

CASH states that the standards of time requirements were based upon "extensive time studies made in conjunction with registered nurses, nursing supervisors, or directors of nurses." Their time calculations are reported as based upon set procedures and skill performance of the "average experienced worker"; however, there is no further explanation of the matter. They also state that from studies of large numbers of patients percentages of patients receiving procedures have been determined.

The material includes a form for classifying patients into three/four categories. Two different references are given for classifying patients. The one, grouping patients into three classes, is along the physiological dimension primarily. The second uses eight categories making use of observations, need for emotional support, medications ordered, and requirements of specific activities. Not explained are combinations of these in order to arrive at the four classes given: • minimal or self-care; • partial care; • moderately intensive or full care; and • intensive, complex, or almost constant care.

The manual is only sketchily developed and raises many questions about the rationale underlying the programs. The analysis of care conveys the impression that nursing is seen as primarily mechanistic and technical.

The writing is poor. The procedures are not well developed and it is impossible to use them without consultation from the CASH consultants.

The basic approach outlined in the programs prepared by CASH is drawn from systems and engineering management. No rationale is given in any of the descriptions of the programs for its use or in the studies drawing upon the methodology.

The assumptions underlying this approach appear to be five. First, by applying selected criteria, patients can be classified into three or four groups, each requiring a different level and amount of nursing care. The dimension along which the criteria lie is physiological. This dimension is the important determinant of the type of nursing care the patient requires. Second, through the use of techniques such as wide and large sampling, the nursing care requirements for these patients, classified into various levels, "average out" in character. Furthermore, since the dimension considered in classifying the patients is a physiological one, the nursing care requirements will draw heavily upon procedures that are derived from a knowledge of the physical sciences. Third, nursing care consists of a series of procedures that are discontinuous and discrete in nature. The knowledge and skill underlying each procedure can be identified and assigned to a specific category of worker in the nursing department. Other than in frequency, these procedures vary little from hospital to hospital and from nursing unit to nursing unit. Procedures are performed for patients in a time sequence, and it is possible to rearrange this sequence to make better utilization of nursing personnel. Fourth, the nursing units selected for the intensive survey selected by the committee of the individual hospital provide the standard of nursing care desired and the level of economy and efficiency believed feasible in that hospital. The nursing unit also operates under the principles of administrative practice endorsed by the administration of the hospital. Fifth, the identification of the frequency at which nursing procedures are performed in the hospital and the application of standard time for the performance of each, predetermined through wide sampling, comprise beginning attempts to quantify nursing care requirements.

The chain of arguments moves forward from these assumptions. Patient care requirements can be identified indirectly by studying present nursing care tasks performed for each patient. Each nursing task is part of a procedure that is discrete, in that it has a beginning point and an ending point. Furthermore, since all nursing care procedures are alike from hospital to hospital and nursing unit to nursing unit, they are standard in description. Through the use of large sampling and time study methodology, a standard time can be set for each procedure that is applicable to all hospitals. For an individual hospital, the data collected about the frequency with which procedures are performed on a nursing unit of its choice becomes the basis from which staffing requirements can be predicted. The frequency of the procedures performed multiplied by the predetermined time standard will give the amount of time required for that population. However, since it is possible to identify the category of the worker who should perform the procedures, it is possible to rearrange the combination of staff members by analyzing the relationship of worker to procedures and by a redistribution of the work, yet keep the time requirement the same.

The factors used in the calculations of the staffing tables and for the preparation of reports and recommendations by the consultants are these:

- tasks or procedures performed on the selected nursing unit or units;
- standard-time allowance for the performance of each procedure;
- number of times the procedure is performed;
- skill level of the worker performing the procedure;
- skill level of the worker desired to perform the procedure;
- number of patients classified by level of care: self-care, partial care, and total care;
- time of day procedures are performed; and
- changes in daily census: admissions, transfers, and discharges.

The general steps in the protocol for making use of the methodology follows a set sequence. There are six parts, although some of these may overlap:

(a) initial planning and orientation of the staff in the hospital, including the establishment of a nurse utilization committee. The committee selects the nursing unit or units to be surveyed and classifies the nursing procedures into basic or special care ones. The basic care procedures are those performed for each and every patient regardless of age or diagnosis. The special care ones are those that depend upon the patient's condition and that may vary in number and in combinations, but not in amount of time required to perform it;
(b) preparation of the basic care and special care procedure survey sheets, by modifying standard forms provided by the consultants;
(c) assignment of these procedures to a particular category of worker. The decision is based not upon current practice in the hospital but upon what is perceived to be desirable practice;
(d) orientation and training sessions involving nursing staff;
(e) a 1-day trial session on the study units;
(f) a 10 to 14 day survey, sampling between 60 to 80 patients, although this may vary according to the consultant group and the hospital; and
(g) analysis of data and report of consultants to

Hospital Administration and others designated by him.

The data collection forms are generally three:

Basic Care Report
Special Care Report; and
Bed Occupancy Report.

From the analysis of these data and from the suggested reassignment of tasks to different levels of workers, several reports are generated. These are:

- an actual staffing plan (as it is in operation);
- a recommended staffing plan;
- a report of accumulated hours, giving the amount of time for each worker and each task;
- a work distribution sampling; and
- recommendations for redistribution of the procedures (the work).

A set of reports is also suggested for management monitoring for quality control. These reports may include some or all of the following:

- a staff requirement report for each nursing unit (for daily use);
- a weekly performance report;
- a weekly utilization report;
- a monthly hours report, which serves as the basis for comparison of staffing among a set of hospitals; and
- the set of forms utilized in the plan of quality control.

C5. Community Systems Foundation. *Nurse Utilization Study: Standard Data Approach.* Ann Arbor, Michigan: Community Systems Foundation, 1967.

Review

Purpose.—In the introduction, the manual states that "the report has been designed to provide hospitals with the necessary information and decision-making tools to meet these overall objectives of progressive hospital administration." Effective and efficient nurse utilization are the objectives referred to in the statement.

The report follows the "standard package of self-help" introduced by CASH. In 1967, the CSF and the Hospital Council of Maryland began a program using the approach to nurse utilization patterned after CASH and involving 14 hospitals. This report describes the objectives, assumptions, and methodology of the study.

Objectives and assumptions.—The objectives of the study are broad in scope, aimed at better staffing, better utilization, lower costs, and improvement in quality and consistency of care. Seven assumptions are made, limiting the study application. For example, the methodology is appropriate for medical-surgical units only. It excludes ward clerk activities except those accomplished by nursing personnel and it includes only personal, fatigue and delay time, and does not include vacation, etc.

Procedure and instruments.—The study procedure consisted of four steps: (a) initial planning and orientation, (b) preparation of basic care report and special care reports, (c) 1-day trial, and (d) 10-day study. Each of these are explained in detail and the forms used for each are included in the appendix.

A nurse utilization committee for each hospital, composed of representatives of administration and nursing service and a member of CSF, performs two important functions as well as serves as a liaison group for the study. First, the committee selects the nursing units from which the data are obtained. These units should be applicable to all similar areas in the hospital and reflect the achievement of desired quality of patient care and the objectives of management for efficiency and economy. Second, the committee also classifies the nursing tasks carried on in the hospital as basic care or special care tasks.

The Basic Care Report is prepared (employing forms provided by CSF), which reflects the basic procedures "given to all patients regardless of condition." It assumes an "average patient" concept. Data are collected on a patient census averaging 60 to 80 patients. The report indicates the tasks, the frequency of performance, and the personnel performing the task. Twenty-four basic tasks are listed for consideration by the nurse utilization committee. This committee determines which apply and which do not. (The time standards set by CASH are included in the form.) The Basic Care Report can also be obtained during the 10-day survey period if there is any question about the character of these.

The Special Care Report determines the special care procedures performed for individual patients by frequency and by classification of the performer. A comprehensive list of 80 nursing procedures, with their definitions and predetermined time standards, is reviewed by the committee and the hospital coordinator and compared with existing procedures with the intent to adopt them or to request a "custom-designed" report with definitions and time standards developed in the 10-day period. The committee also is asked to assign the desired nursing skill level to each task.

Attention is given to the classification of patients into three categories: self-care, partial care, and complete care. Characteristics of each group are given.

The procedure for the utilization study consists of a 1-day trial following orientation sessions for all personnel involved. In the orientation sessions, particular attention is given to an explanation of the study, the role of the personnel, and the written instructions given to each participant.

The 10-day survey concerns itself with the collection of a Special Care Report for each patient on the study unit. Each patient is classified into one category. If his category changes, a new Special Care Report is initiated. A random inspection procedure is provided to insure accuracy and completeness. A refined measure to ascertain bed occupancy may also be applied during the 10-day period.

The data collection forms (Basic Care Report, Special Care Report, and Bed Occupancy Report) are analyzed to generate an actual staffing guide, a recommended staffing guide, a report of accumulated hours, and an actual work distribution. The actual staffing guide is derived by multiplying frequencies by predetermined time standards (CASH). The recommended staffing guide takes into account the decision by the Nurse Utilization Committee on desirable skill placement but does not result in a change in total hours of time.

The study also provides a set of reports to be filled out for management monitoring. Included are: • staff requirement report (for daily use) prediction based on category of patients; • weekly utilization report, a comparison of daily nursing hours required per shift with actual hours worked; • weekly performance report; • "monthly nursing hours," sent to the Hospital Council of Maryland so that comparison with other Maryland hospitals can be made; and • monthly personnel proficiency report.

Critique

This manual concerns itself with the question of determining staffing for medical-surgical units and some measurement of their effective utilization. The question is highly pertinent, not only from a financial standpoint but from the use of appropriate talent.

The report is really not a study although this term is included in the title. It is a report of methodology, an approach to determining staffing and to management control. The report of the methodology reflects its drawing upon time study, task identification, and work count as its basic methods. In addition, it does classify patients. The instruments (forms) are clear with the exception that time standards (predetermined) and definitions are omitted as being too voluminous.

Some of the specific questions of this methodology are the basic assumptions made. Examples of these questions follow: • Can an "average" medical-surgical ward be assumed? • What is the basis for a sample of 60 to 80 patient average, 10-day, survey? • Is the assumption made that nursing is primarily composed of these specific tasks (highly physical in nature), physiologically based, acceptable? • Is it the premise that the high quality care of the "status quo" is desirable and to be perpetuated? • Upon what variables are the predetermined time standards based? What clinical and environmental variables were considered? How was average time, leveled time, and standard time computed? • The patient classification is derived from physiological measures, almost in its entirety. What is the basis for these characteristics? • Is it not possible that the skill level for specific tasks for patients may vary depending upon the circumstances? • What allowance in time variation is made for supporting services? For use of materials, etc.? • Are medical and surgical units so similar that one in a hospital can be used as the base?

No knowledge or theory base for the methodology is presented, either from the psychology of work, from nursing, or from systems theory. It apparently draws upon industrial engineering, which sees work as a bundle of tasks with the "average" man able to perform at a set level. There is no discussion of the conceptualization of aspects of nursing as technical, as repetitive in nature, and as designed with little variation. Neither does the report disclose the variations due to patient classification. Therefore, little is added to the knowledge base about the requirements of patients.

Nothing is said about *omissions* of work, and no reference but one is given to expectations of quality.

The study presents a methodology that is applicable, realistic, and based upon the conceptualization of nursing as a bundle of identifiable tasks. There is no question but that the approach is feasible. Whether it is valid, reliable, and based on knowledge of nursing practiced professionally is the matter of great importance.

C6. Dunn, Helen. "Criteria for Patient Classification According to Nursing Care Requirements and Personnel Assignment." Department of Nursing, University of Illinois, Chicago, Illinois, 1968. (Mimeographed).

Review

Dunn classifies patients (in table form) according to nursing care requirements. Patients are classified into four categories: Intensive Care I, Intermediate Care II, Moderate Care III, and Minimal Care IV. Basis for the selection of criteria for patient classification is not included with this table.

Criteria for patient classification are:

A. General Criteria—each patient category is based on the capabilities of the patient to resolve nursing problems and the amount of nursing supervision and care required.

B. Specific Criteria—is based on the degree of symptoms exhibited by the patients, the control of patient activity required, the extent of nursing care and observation required, the stability of the emotional and physical condition of the patients, and the need to plan for community and home care of the patients.

C. Nursing Care Characteristics—establishes each level of skill required, constant or intermittent. Need for application of knowledge from the physical, behavioral, and biological sciences on a regular basis during a 24-hour period.

D. Level of personnel desired is determined by the level of nursing skill required and the proportion of time each skill is required.

E. Predicted assignment times that influence categorization are shown in the amount of time required for RNs, LPNs, and nurse aides by shift, day, or week as needed.

F. Prototypes according to clinical area. An attempt has been made to apply the above criteria to problems specific to the following services:

1. Surgical—

   Degree and type of illness requiring surgery;
      chronically ill
      terminal
      negative changes in condition
   Preoperative and postoperative psychological care and teaching;
   Types of complicated treatments and dressings;
   Negative changes in condition;
   Emergencies; e.g., extreme blood loss;
   Kind and extent of discharge planning and direction for self-care.

2. Orthopedic—

   Respiratory problems associated with particular types of beds or equipment;
   Extent of postoperative supervision;
   Amount of reassurance required for psychological problems;
   Extent of skin care required, frequency of turning, etc.;
   Amount of care required for patients in traction, cast, wheelchairs, etc.;
   Extent of treatments and dressings required;
   Physical and mental dependency of the patients: senile, mentally retarded, cerebral palsy, polio, etc.;
   Extent of isolation procedures;
   Extent of teaching and preparation for discharge;

3. Medical—

   Amount of observation required; e.g., CV monitor recordings;
   Problems of tracheal aspiration;
   Extent of respiratory distress;
   Degree of stability of vital signs;
   State of circumstances;
   Contagiousness of the disease;

Amount of teaching and constructive planning for posthospital regime;
Psychological state of the patient: suicidal tendencies, terminal, etc.;

4. Obstetric-Gynecological—

   State of pregnancy: antepartum, in labor, in delivery, postpartum;
   Type and extent of complication;
   Social or emotional implication associated with pregnancy and delivery;
   Patients having radioactive isotope therapy;
   Extent and type of surgery involved;
   Extent and type of treatments involved;
   Kind and degree of illness;
   Preparations for discharges.

5. Pediatric—

   Likelihood of airway closure
   Extent of emergencies: blood loss, ingestion of poisons, etc.;
   Existence and extent of postoperative care;
   Infectious nature of the disease;
   Children with newly recognized medical conditions: e.g., diabetics;
   State of consciousness of the child;
   Extent of complicated treatments and observation needed.
   Age of the child;
   Psychological care of the child, emotional support of the family;
   Acuteness of the disease involved;
   Kind and degree of illness;
   Type and extent of patient and family teaching required.

Critique

This is a classification scheme of patients that has been used at the University of Illinois Research Hospital in its staffing methodology. It was applied by Chaska in a study of staffing needs in Rhode Island Hospital, Providence, Rhode Island.

The mimeographed materials include only statements of criteria. Since no other documentation is available, one cannot judge feasibility or reliability of the system. There is no information about the procedure for use of the criteria or how to compile and use the numbers once they were obtained.

The value of the statements resides in their content. An effort has been made to combine several variables in a continuum of patient classification: degree of symptoms presented, level of nursing knowledge and skill required, level of personnel and proportion of time required, and patient capability to solve his own problems of care. These statements could serve as a basis for measuring patient care requirements; however, the scheme requires testing for reliability and it needs validation. How to attach or translate staff requirements from the findings remains a mystery.

Because of the lack of detail about application and about its validity and reliability, the scheme is not feasible as it now stands for use in a staffing methodology.

C7. Gunn, Sister Mary Laura. *A Method for Developing a Master Plan for the Nursing Service Department*. St. Louis, Missouri: The Catholic Hospital Association, 1960.

Review

Purpose.—To present a method for estimating the personnel requirements for a department of nursing service for a specified period—usually the fiscal year.

Premise.—The author contends the problems of acquiring and maintaining personnel and the shortage of existing personnel are often used as excuses for understaffing. The real problem is faulty planning by the administration of the nursing service department, resulting in the ineffective utilization of personnel.

Terms are defined for use of the study. Related literature is reviewed and presented as a historical evolution of the nursing profession from the 1930's to 1960, including • objectives of nursing education; • need for auxiliary workers; • changing concepts of nursing (development of comprehensive nursing care); and • departmental reorganization, administrative separation of nursing education and service departments. Gunn outlines the present needs as • thorough understanding of the purpose of nursing service, • concentrated and cooperative efforts toward sound organizational structure, and • study of nursing demands. Factors influencing staffing are outlined.

A. Changing concepts of nursing—
   1. Professional status of nurses and changing patterns of patient care;
   2. Advancements in nursing education and its relationship to the concept of total patient care;
   3. Leadership role of the nurse
      Delegation of nonnursing duties to auxiliary personnel,
      Retention of complex nursing activities,
      Treatments delegated to the nurse by the medical profession,
   4. Basic concept, rendering care to the patient, is unchanged but the scope has broadened and has influenced quantity and quality of the nursing staff required.

B. Demands for nursing service have increased, influenced by an increase in daily census and shorter length of patient hospital stay, complexity of medications and treatments, size of the hospital, and available facilities. Physical facilities, supplies, and equipment influence demands for nursing personnel.

C. Purpose, philosophy, and objectives of the hospital. Specialty hospital versus broad purpose hospital

D. Hospital policies and practices

E. Personnel policies

F. Organization of the nursing service—Sound departmental organization exists when administration (a) gives support to and recognizes the need for the organization; (b) acknowledges departments administrative status, scope and authority commensurate with responsibility; and (c) delegates its administration to competent qualified personnel.
   - Purpose and objectives of nursing service are in writing and readily communicated.
   - Organizational charts illustrate lines of authority and channels of communication for inter- and intra-departmental communication. They also indicate span of control and they are current.
   - Administrative policy manuals are inductive of good administrative organization and are up to date.
   - Nursing practice manuals contain written treatment procedures, consistent in method, and are reviewed for changes at regular intervals.
   - Periodic evaluations of clinical facilities determine available supplies and equipment and the need for new and expanded facilities.
   - Administrative meetings, committee activities and interdepartmental meetings for all levels of personnel are held.
   - Job descriptions and specifications for all levels of personnel, a copy given to each employee, are used in selection and promotion of employees.
   - Inservice education of personnel is offered including orientation, service training, continued education, and leadership and management development.
   - Nursing service budget is provided.
   - Appraisal of nursing care is a continuous process—
     to develop more efficient methods,
     to direct nursing hours to more care for the patient,
     to determine that nursing personnel are performing nursing tasks: methods of assignment frequently reviewed, much consideration given to job satisfaction if qualified, efficient staff maintained.

Chapter III is devoted to preparing the staffing plan. Factual and supportive information required in addition to that presented earlier includes • average patient stay in the hospital, • average number of patients by service, and • average daily census of the hospital over a specified period (preferably the previous 6 months). Additional information required include • short-term patients and acuteness of the patients' illness, which increases the demand for nurses; • duties connected to nursing reassigned to the appropriate service; • central messenger service—desirable but, if not available, supervisor's estimate should allow for time spent on errands; • estimate of adequate patient care needs per day ratio of professional to nonprofessional personnel, daily number of patients per supervisor, head nurse, and nursing unit helper on each shift. Daily time sheets (appendix I) and Monthly Summary Reports (appendix II) show the above summaries; • vacations spread over the entire year with advanced scheduling; • personnel needs determined on a yearly, weekly, and daily basis, allowing for days off, holiday time off, vacations, and illness. Student rotations should be included in the staffing plan.

Method of preparation.—The master staffing plan should be made with the help of the supervisors after they are thoroughly oriented to the plan. Each supervisor should make an estimate of need for the section (appendix III). The director makes the master plan for the entire section and gets administrative approval for the plan. Personnel director is notified of the staffing plan so that he can be aware of recruitment needs. The plan should be subject to change and allow for emergency situations.

Technique of developing staffing plan.—A fully developed staffing plan is shown depicting coverage for a 40-hour week, 8-hour day, with absence allowances. These allowances are converted to percentages, and personnel coverage is determined. Hours of nursing care per patient are determined according to the type of patient receiving the care and "evidence of need." Practical nurses are planned for separately. Head nurse time is not included. Total personnel are estimated according to availability, response of personnel to service, patient's condition, and type of illness.

The master staffing plan provides considerable information for budgetary control showing the personnel that will be needed. Supplies and equipment are estimated from this information for the coming fiscal year.

Summary and conclusions.—Advances in medicine and scientific knowledge, the author feels, have led to involvement of community health. Hospital organization has become more complex. The nursing service has acquired equal status with other departments. Nursing service and nursing education have become separate entities, each working for their own purpose. This separation has caused a depletion in nursing service, and the use of auxiliary personnel has been a partial solution to the problem. The nurse now functions in a leadership capacity, and the nursing staff functions as a team. Effective planning is the result of cooperative effort of administrative and supervisory staff. The master staffing plan should be based on factual supportive data pertinent to a particular hospital.

It was concluded that long and short range planning is a basic administrative function of the director of nursing service. Staff plans must be developed for individual hospitals and all jobs specified. The master staffing plan is an administrative tool that augments organization efficiency and assures optimum nursing care for the patient.

Critique

An approach for developing a master staffing plan for nursing service is presented in this article. The major purpose is the presentation of a method for assessing personnel requirements.

Gunn's premise for development of a staffing plan is well outlined and based on a review of related literature.

It is not a new concept that many staffing problems attributed to the nursing shortage are more often due to lack of organization within the nursing service. Gunn's suggestions for improvements in nursing service organizational practices are sound. One chapter is devoted to the preparation of a staffing plan based on factual and supportive information for the development of a staffing plan and a sample of a fully developed staffing plan is included in the article. These are readily adaptable for the nursing administrator in their specific hospitals.

Continuous appraisal of nursing care and personnel satisfaction is given consideration in determining available hours and efficient methods of assignments and care; however, specific methods for the evaluation of care quality are not included. It is assumed that this would result from improved methods and the resulting increase in available time.

This article does not make a contribution to the field of nursing research, but it presents a staffing plan developed by the author based on an extensive literature review.

C8. Her Majesty's Service. Department of Health and Social Security. "Hospital Building Procedure." Note 6, dated April 6, 1970, Friars House, 157–168 Blackfriars Road, S.E. 1, London, England. (Mimeographed).

Review

This is an internal document used by the Department of Health and Social Security to provide guidelines to institutions, those existing and those being built, to estimate the "consequences of capital schemes." In the document, information is provided to assist in the projection of nursing staff requirements and the cost of that staff. In personal conversation with E.B. White, the nurse staffing officer, it was learned that these figures (ratios of nurses to beds) had been developed by a nurse in the Department drawing upon her background of knowledge and experience. No studies were conducted. The methodology includes consideration of these variables: • specialty or department (clinical unit), • number and size of nursing units, • size of institution, • number of operating room theaters, • number of outpatient attendances, • number of day units in psychiatry and geriatrics, • size of recovery room, • observation units, • number of accidents and emergencies, • annual leave, • sick leave, • students and pupils, • special units, and • ward size.

The basic approach stated in this document is mathematical. A ratio is established for nurse to number of beds, or cases, or allowance of percentages for sick leave, annual leave, or students and pupils. A calculation is made to allow for the influence of size of nursing unit.

The basic assumptions underlying this approach appear to be six. First, the nature of the clinical service does reflect the amount of staffing required, in that speciality units require the highest concentration of staff. A continuum of intensity and complexity can be established utilizing the various clinical services. Second, smaller sized nursing units require more nursing staff for total 24-hour coverage. Third, operating room theaters staffing is based upon the room, not necessarily the procedure or case. In other words, in the operating room and emergency theaters, the central core for staffing is the total staff required to bring services to one operating unit. Fourth, the nursing administration staff requirements are based upon size of institution. Fifth, staffs vary little in sick leave and annual leave allowed. Sixth, the contribution of students remains stable from setting to setting.

This methodology is based upon the wide experience of an individual. It has not been drawn from empirical studies.

The procedure is very simple:

(a) specific figures about the hospital population are obtained; and

(b) straightforward calculation is made according to the scheme provided.

Critique

This is a statement of methodology used for computing staff requirements resulting from new construction. It consists of the use of mathematical ratios based upon selected variables. No theoretical framework is provided, but the formula was based upon a survey of staffing practices in hospitals and opinions held by matrons in hospitals. The Department of Health and Social Security conducted the survey.

The methodology has had a tremendous impact upon the nurse staffing picture in Scotland and England, since it is being used throughout the National Health System.

C9. Hospital Management Engineering Program. "Nursing Unit Quality Index Plan." Western New York Hospital Association, 2005 Sheridan Drive, Buffalo, New York, (no date).

Review

Purpose.—To develop a plan for reporting on the quality of care provided.

Hypothesis.[1]—"Trained professional personnel may be one of the most effective means of detecting gross nursing deficiencies by direct inspection of both the patient and his immediate environs."

"Careful and critical review of patient record on the nursing unit can form a valuable supplementary source of information regarding nursing proficiency."

The hypothesis is drawn from an article by Mark S. Blumberg, M.D., and Jacqueline Drew, R.N., entitled "Method for Assessing Nursing Care Quality." The overall plan is based on CASH.

A list of meaningful attributes for the patient environment, for patient charts, and for the nursing unit was developed by members of the nursing profession. The engineering profession designed techniques to carry out the tests based upon the use of statistical quality control methods.

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[1] "Hypothesis" singular is written in the review as shown in the study, but is corrected in the critique.

Objectives.—To provide a measure that will indicate the level of quality of care and service and the degree of nursing proficiency.

To provide these measures on a continuing basis or on ongoing management control.

To provide feedback as an allowance for necessary corrective action.

Methodology.—The Unit Quality Index Plan is based on sampling within a nursing unit, measuring indications of patient care quality and yielding a single periodic control index. The quality control checksheets cover items about patients' charts and the nursing unit. These list a number of questions relating to quality that can be answered "yes" or "no" by direct observation. The questions listed are those most frequently considered by nurses to be key indications of quality care. Five of each of the three checklists are to be filled in during a control period spaced at 1 or 2 weeks. A random schedule should be used in making observations. The control index is proportionate to the percentage of acceptable conditions to the total number of observations. Depending on the percent of acceptable ratings, additional checksheets may be required to achieve an acceptable degree of accuracy. Control indexes should be recorded and posted and eventually graphed.

To achieve objectivity, the observing and rating should be performed by nursing supervisors. The time for the observation and the room to be observed should be based on a Random Schedule of Observations, which is illustrated in one of the exhibits included in this report. The appropriate quality control checksheet should be used for the service involved. The head nurse should accompany the observer if possible. Only the immediate prevailing condition of the relevant factor should be checked. The charge nurse should be consulted if there is a question about a "yes" or "no" rating. All negative comments should be supported by comments giving evidence. At least 14 ratings for each checksheet should be made. A minimum of five checksheets for each unit for each control period should be obtained.

The quality control checksheet for the patient consists of 22 items classified in three categories labeled as • patient welfare and safety, • patient comfort and accessibility of immediate needs, and • patient room. Examples of these items are: dressings clean and comfortable, side rails up if required, patient appears to be comfortable, before meal preparation, and noise level satisfactory. The checksheet for patients' charts includes 21 items such as, Is chart correct, are reasons for PRN medications noted, is intake and output properly recorded, and are admission notes complete? Examples of the 12 items on the nursing unit checklist are as follows: Is the medicine area tidy and clean, is the utility area clean and in order, is no unnecessary equipment in the corridor, and does nursing station appear to be organized?

To determine the number of observations that should be made, the acceptable ratings are divided by the total ratings. A chart of "additional checksheets required" is referred to in order to determine the additional number of checksheets necessary after the initial check. For example, if the ratings are 83 percent acceptable, only one additional checksheet (after the initial five) is required.

The unit quality index is calculated after a sufficient number of checksheets are obtained. An index conversion table is referred to in order to record each index. The table is based upon the consensus of nurses having developed the Quality Control Plan.

All quality indexes should be recorded on a Quality Control Record to indicate the results for the control period. This record should be updated and posted or distributed. The quality control indexes should be plotted graphically on an ongoing Performance Chart for each nursing unit to provide a picture of trends in quality control.

The Quality Control Summary Report provides information that is calculated and published in the monthly Personnel Proficiency Report.

Critique

This publication of a nursing unit quality index plan is a straightforward description of forms and procedures that can be used to assess quality of care on a specific nursing unit.

The basis for selecting the particular type of assessment, that of inspecting the patient, his environment, and the patient's chart, is based on an article by Blumberg and Drew that itself is a survey of methods. The source of the hypotheses in no way supports or denies the validity of this particular method. There is no other theoretical framework.

The method of selecting the specific items included in the checklists is not disclosed in this report. No statements of reliability or validity are presented. The selection of the observers is based upon a statement that they be nursing supervisors and adequately trained. Since the observer makes the decision as to the presence or absence of certain conditions, it is unfortunate that so little attention is given to the selection of observers and the training that they may need. The items do not lend themselves easily to direct yes or no answers; for example, "Have patient's physical needs been met?"

The information regarding sample size needs further interpretation and clarification. The use of the Unit Quality Index Plan, Quality Control Record and Quality Summary Reports is not sound unless the basic data that comprise these reports are valid and reliable.

This report is useful in assessing quality only in that it suggests that attention be given to the matter. However, the methods must be adequately tested before they can be of use to nursing practitioners.

C10. Hospital Management Engineering Program. "Nurse Utilization and Staffing Control Methodology." Western New York Hospital Association, 2005 Sheridan Drive, Buffalo, New York, (no date).

Review

Purpose.—The purpose of the program is to plan better staffing for medical-surgical units, to utilize professional nurses at their most effective level, to reduce costs of operation, and to improve patient care.

The program is patterned after a similar one developed by CASH. It is the purpose of the Western New York Hospital Association's Hospital Management Engineering Program to develop and apply scientific management tools to assist member hospitals in the planning and establishment of effective and efficient patient care systems. Members of the nursing advisory committee are listed and comprise a group of seven nursing administrators.

Method.—Identification of nursing tasks and their frequencies is accomplished through an interview between the project coordinator and representatives of nursing service. Predetermined time standards based on routine nursing tasks are extrapolated to allow nursing supervisors to become aware of how much nursing staff time by skill level is involved in basic nursing care.

The determination of nursing man-hours required for the special nursing tasks involves the classification of patients according to their conditions (self-care, partial care, and complete care) and a 10- to 14-day survey to determine the frequency of these special tasks. The survey is conducted by all nursing personnel of the specific unit under the direction of the project coordinator.

In addition to forecasting daily staffing requirements, this information is used for work distribution profiles, weekly utilization and performance reports, and comparative reports between hospitals.

Basic care is that level of care given to all patients regardless of patient condition. The report determines the basic care procedures, the classification of personnel, and the frequency of performance. The 25 items described in the manual's basic care report serve as a guide for surveying basic care tasks and include admissions, census count, linen-disposal, and premeal care. The time standards associated with each listed basic care procedure were established by time studies made in conjunction with a registered nurse and includes allowances for personal time, fatigue, and delay time.

Nursing personnel are required to determine what nursing skill level is required to perform the activity. The activity frequencies are multiplied by the predetermined time allowances to determine the amount of nursing time involved in basic care. The total amount of care required is the sum of nursing time involved in basic care and special care.

The special care form is used during a 10- to 14-day survey to determine nursing care requirements that vary as a function of patient condition. To develop a form that reflects the care tasks performed in each hospital, the hospitals' nursing procedure manual and nursing activity list presented in the manual are used as guidelines. One special care report per 24 hours is derived from the nursing activities list, which includes a listing of 99 items such as a.m. care, call lights, douche, force fluids, IV start, discontinue oxygen, up in chair, etc. This report form is kept at the patient's bed where it is checked as tasks are performed for 24 hours and changed prior to the morning shift. All patients are classified into three categories by determining what characteristics apply to each patient. A new special care report is started if the patients' category changes within a 23-hour period.

To determine the hours of nursing care, the numbers of self-care, partial care, and complete care patients are recorded and totaled. The hours of care are noted for the specific numbers of patients for each shift or are determined by the engineering staff using data from the Basic Care Report and Special Nursing Care Survey.

For each shift, classification rates were computed reflecting a percentage breakdown of the existing staff. The total number of staff hours needed is multiplied by the percentage of the staff of a specific skill level. The engineering group provides a chart with these computations.

Reports.—A work distribution profile can be prepared and used by each hospital that desires to analyze and schedule nursing tasks and procedures. The recording of tasks that occur at certain times of the day and the nursing skill level required highlights tasks that require the most time and occur most frequently.

The weekly nursing utilization report compares the nursing hours required for each shift each day with actual hours worked. Nursing hours required are based on the Staff Requirement Report.

The weekly performance report is a visual plot of the weekly nursing utilization report for a period of 6 months.

The hospital personnel proficiency report allows each hospital to compare its performance with other similar hospitals.

Critique

This brochure describes the approach to staffing methodology offered as a program by this hospital association. The program has direct linkage with that of CASH's and is very similar in all respects.

A statement of the objectives of the program, the forms, the procedure, and reports generated from the data are given in the contents of the brochure. However, the contents are sketchily drawn. There is not sufficient detail provided the reader so that the method could be used without consultation. Directions for use of the forms and the forms themselves are confusing.

The rationale underlying the approach is missing.

C11. Julian, Florence. "Patient Classification Systems." Department of Nursing Services, University of Minnesota Hospitals, Minneapolis, Minnesota, January 31, 1968. (Mimeographed).

Review

This is a description of the methodology used at the University of Minnesota Hospitals to classify patients. Four categories are used, based upon the amount of care required.

The categorization guidelines used by VA Hospitals served as the basis of the system. The sampling period on each nursing unit was for 2 weeks. This was followed by activity analysis to determine how much time was spent for patients with various levels of care. The patient sampling was 380 patients on 17 nursing stations selected so that three patients in each category per unit were studied for 3 days.

From the activity studies, it was found that:

- Category I patients needed 7 hours of care in the 24 hours;
- Category II, 3 to 5 hours;
- Category III, 2 hours; and
- Category IV, ½ hour or less.

The activity analysis and the kardex card on each patient in the activity study served as a basis for developing guide lines for care and for teaching staff to categorize patients. The categorization of each patient appears on his kardex card, helping to identify workload of a particular station. The the nursing office, which serves as a management tool.

Critique

This patient classification system is drawn primarily from the guidelines developed by the VA Department of Nursing. There is no other theoretical framework provided for the scheme.

This article is a description of an approach for classification of patients, how to determine time required for the total unit population, and how to use materials. Factual data about the system, the basis for the determination of hours, and the testing of tools used in the scheme are missing. It is an example of the extension of the VA classification system.

Therefore, although the scheme is directly related to nurse staffing methodology, the information about its derivation and application is so skeletal that its translation into a methodology is impossible. The use of the mimeographed paper is restricted to its local situation. Individuals in that setting can undoubtedly enlarge upon the details required for its application.

C12. Massachusetts Hospital Association. "A Staff Utilization and Control Program for Nursing Service." Divisions of Systems Engineering, Massachusetts Hospital Association, Boston, Massachusetts, (no date).

Review

Location.—This manual is an explanation of the program of nurse staffing developed by the Massachusetts Hospitals Association Program. The manual is concerned with the implementation of a methodology for measuring nursing personnel requirements and utilization on a continuing basis.

The methodologies and data from CASH are used as guidelines in this program.

Purpose.—The purpose of the program is described as follows: (a) to establish staffing guidelines based upon the nursing requirements of each individual hospital, (b) to provide an objective means of determining daily manpower needs for each nursing unit, (c) to provide the controls necessary to measure the level of staff utilization, and (d) to provide continual information feedback for ascertaining when and where corrective action is needed.

Method.—From the "basic care" and "special care" data, the individual daily staffing guide is computed. Basic care data includes the time it takes an average, experienced employee, using an acceptable method, to perform the procedure, with allowances for personal, fatigue and delay time, using an "average" patient. (The exact method of obtaining this time standard is not included in this report). Special care data includes information regarding special care procedures, frequency of procedures and the type of nursing personnel performing each procedure obtained over a period of 10 days on each unit.

The staffing guide is based on shift, census, and patient mix. (The staffing guide mentions three types of patients but the definitions of these types are not included in this report.)

In order to determine staff requirements before the start of the shift, the number of patients and the nursing needs of each patient are estimated by using the daily classification sheet. This form includes 23 types of activities that may require nursing care for a particular patient (activities include: to be discharged, slight emotional needs, vital signs ordered every 2 hours, etc.).

A Weekly Performance Record is designed to provide a weekly management control for each unit. This record graphically portrays staff utilization and established control limits.

The Nursing Hours Summary Report provides information for the monthly proficiency report that is to be sent to the hospital administrator. This latter report includes the guide of hours worked for each unit and the net hours worked.

Critique

This manual is an adaptation of the CASH methodology and the author credits the parent organization for its contribution and for providing the materials upon which the guide is based.

The methodology, therefore, draws upon industrial engineering techniques. The variables are the same as proposed by the CASH engineers: nursing tasks, by number; patient classification into three groups; and census and staff data. There has been no innovative thinking introduced into the study of nurse staffing methodology.

The manual is lacking in clarity and in documentation. The exhibits include the checklists, information gathering tools, and conversion tables. However, only with a basic knowledge of CASH's methodology or with the consultants could one make use of these exhibits.

The manual provides little to enlarge the thinking about approach to nurse staffing.

C13. Operational Research Unit, No. 9. "Measurement of Nursing Care." Oxford Regional Hospital Board, Old Road, Headington, Oxford, England, 1967.

Review

Purpose.—The purpose of this pamphlet is to explain the process of establishing a simple and convenient method of assessing workload of the ward without incurring the cost of activity analysis or continuous patient observation.

The nursing records represent the key to the nursing workload and are used as a starting point. It is necessary not to add to the existing work of the hospital staff.

Method.—The elements that are used by nurses to assess amounts and degrees of care, such as consciousness, continence, and ambulation, are the basis for the construction of an index of nursing workload.

The Oxford Regional Hospital Board extended and generalized the care groups identified by Charles Flagle and coworkers at Johns Hopkins Hospital. The development of the record form, definition of the care groups, results, and potential uses are discussed.

A list of nursing items that could be used on a wide spectrum of patients was evolved over a 3-year period of experimentation. The Nursing Care Form can be used up to 14 days for each patient. Four categories of red print items relating to the patient's present condition are mobility, bathing, toilet, and feeding. The black print items relate to the patient's condition over the previous 24 hours and include such categories as type of suction, frequency of TPR and B/P, seven major types of treatment, kinds of extra staff required, description of mental state, and number of hours up. Experience shows that the items of care as described are easily understood by nursing staff. Records for a ward of 20 to 25 patients can be completed by the ward sister in 10 minutes per day. The Daily Ward Report consists of the same type of information as the composite form but includes the name of each patient. Each of the forms can be readily adaptable to mechanical processing.

The data from these forms are used to categorize patients into five care groups. Expanding the Johns Hopkins model, three levels of intermediate care are defined. The criteria used to differentiate these categories are various combinations of items from the Nursing Dependency Form.

The amount of nursing time received by patients in the different care groups was obtained by activity sampling and continuous patient observation. In a study of 6,000 hours of nursing, the average time spent during a 6-hour period by all grades of nursing staff was 10 minutes per self-care patient, 22 minutes per intermediate care patient, and 44 minutes per intensive care patient. Doubling these figures gives an estimate of the average time spent on direct patient care during the day.

There is a wide spread in nursing time given to intensive care patients. The range for self-care patients is less. The approximate ratio of 1:2:5 is a convenient yardstick for converting care groups to an overall index of workload. Within the five care groups, the scores of first and fifth category are the same as for the other three care groups. The variation in workload can be reduced by combining beds into larger organizational units so that several wards would be administered as one unit. The consequent reduction in the variation of workload is proportional to the square root of the number of wards combined.

The scoring of categories still compresses the data into a relatively small number of groups, losing much valuable information. The statistical technique of regression analysis can give the best results. A score is allocated to each individual item on the form. The sum of these scores for each patient is an index of the amount of care required. The dependent variable is the number of minutes of nursing care the patient received (obtained from continuous observation) while the independent variable is the nursing details recorded by the ward sisters. Data from 431 patients and 569 patients were examined and provided similar results. The efficiency in predicting the total amount of nursing care is four times greater than when the information is analyzed in terms of three care groups. It is noted that incontinence separately is an effective discriminator in the amount of nursing care required. Because of a wide variety of nursing practices between hospitals, it is necessary to determine appropriate regression weights for each hospital, based on data from the forms, and continuous observation of the nursing care for a reasonable period of time. A standard library program can be used to carry out the regression analysis or a computer analysis.

Examples of uses of care group and workload index are presented.

A sample model of the pattern of patient care for uncomplicated cases and uneventful recovery includes stage of admission to operation, stage requiring heavy or medium care, and stage requiring light nursing care. The dependency of the patient is a continuous process, sometimes increasing but other times diminishing. The care group analysis measures the point reached on the continuum of care, analogous to the way temperature readings indicate physical condition. The care group classification can provide information as to how long a patient is in a particular state. A dependency chain is a linkage of the day to day care group classification. On 11 wards in six hospitals, the majority of patients can be classified into 20 chains. In gynecology, a common change is 1–3–2–1 to represent self-care on admission, followed by an operation or treatment to convalesence and recovery. A group of 142 patients admitted for dilation and curettage were analyzed. Over a quarter of the time is spent in care group 1, a fifth of the time in group 3 and over half the time in a convalescent stage. Striking differences occur between hospitals and surgeries although the time spent in care group 3 is fairly constant.

The data from a general hospital of 200 beds (combining all wards) give rise to consideration of the probability of moving from one group to another. The probability of being admitted in care group 1 and discharged without going through any other care group is 47 percent. The probability of transferring from care group 1 to care group 2 is 33 percent and from care group 1 to 3 is 20 percent. The pattern varies between wards. Eventually it may be possible to predict the workload index 1 or 2 days in advance facilitating the organization of staff and equipment for treatment of the patient.

The care group system contains both practical and theoretical potentialities and provides a sensitive index of the daily progress of the hospital.

Critique

This pamphlet, concerned with the determination of nursing workload, is based upon the thesis *Measurement of Nursing Care* presented in 1965 to the Faculty of Letters of Reading University for the degree of Doctor of Philosophy by A. Barr. The work draws upon that of Flagle and the Johns Hopkins group, greatly enlarging it. There is some supporting documentation, drawn from Barr's thesis, for the various proposals of data collection and analysis made throughout the pamphlet.

The writing is clear and the ideas are logically developed. The forms are reproduced fully and an explanation of their derivation, the rationale underlying eacn, frequently the supporting data upon which it is based, and the procedure for use are included. The categorization of patients into three groups, expanding Connor's work, builds into the scheme additional features of great pertinence to nursing personnel. However, Barr found that a five class system was preferable and this is proposed in the pamphlet. The definitions to be used in the classification system are precise. Examples of use to be made of the scores obtained are clear.

There are two exciting features about this pamphlet and its use in staffing considerations. The concept of care group analysis is logical and merits study, since it suggests prediction of care requirements from time of the patient's admission. This idea leads to the second, the possible prediction of transfer of patients from one care group to another, making group prediction possible.

Although much of Barr's basic research is referred to in the pamphlet, it is only sketchily presented. Therefore, the reader will wish to refer to the basic work for documentation of the findings presented.

C14. Paetznick, Marguerite. *A Guide for Staffing a Hospital Nursing Service*. Geneva, Switzerland, Public Health Paper, 31; World Health Organization, 1966.

Review

Purpose.—To present material that will be useful when considering the staffing needs for a hospital nursing service.

Rationale.—The guide is based on information and opinions collected from some 112 nurses, doctors, and hospital administrators from various countries in the world. The author visited hospitals and health units in Egypt and Iran.

Method.—The director of nursing services must work out the problems of staffing by methods based on the needs of the patients in that particular situation and the known principles of good personnel management. The director must have a background of knowledge that will enable her to make judgments of highly technical nature concerning the patient care and also the ability to provide leadership to the nursing staff in the solution of problems in patient care and in the training of student nurses.

Recognition of staffing problems and the planning begins with the director of nursing service. Using the guide as a basis for discussion, the director enlists the support of hospital administration, physicians, and the nursing staff. Further planning involves the consideration of the existing ward-staffing pattern, requirements of the patients, and construction of the staffing pattern. The Daily Time Assignment form can be a basis for raising pertinent issues that must be considered. The workload to be undertaken in caring for patients must be considered in terms of the quality of nursing, characteristics of the patients, and the schedule of nursing care. The quality of nursing can be judged by the sympathy and understanding shown by nurses. The characteristics of patients that influence the staffing of a nursing unit are the number of patients, the placement of each patient in the nursing unit, the diagnosis, the acuity of illnesses, and any special nursing requirement. Scheduling nursing care that will be the greatest benefit to the patient and for satisfactory organization of the workload raises questions. Categories of workers vary in different countries and in different hospitals, but it is generally agreed that both the graduate of a formal teaching program in nursing and auxiliary nursing personnel are needed. The work assignment is made by the head nurse on a day to day basis. The third part of planning the improvement of nursing care through staffing is the actual construction of a staffing pattern. The Daily Time Assignment form and the Characteristics of Patients form are used for a week or two to set standards. The Weekly Time Assignment is a plan of personnel time assignment and becomes a variable record. It can be used for an evaluation of the amount of nursing time provided for patient care and the time contributed by certain categories. The method of selection of the basic number and category of personnel needed is suggested in the Ward Staffing Pattern forms. This form allows for calculation of needed personnel on all shifts for an entire week based on established numbers of personnel. The form entitled "Master Staffing Pattern" is used to calculate the numbers and categories of personnel needed to staff a hospital nursing service.

Factors relating to the care of the hospital patient are grouped under three areas: (a) personal care of the patient and services performed by other departments, (b) physical environment of the patient, and (c) ward management of nursing care. The discussion of these factors is presented primarily in terms of questions, suitable for discussion. The areas under personal care of the patient are nursing care and medical care. Questions concerning services performed by other hospital departments include medical services, dietary services, pharmacy services, X-ray services, laboratory services, medical records, outpatient department, social services, admissions, housekeeping, laundry and linen, plant maintenance, and business office. Areas relating to the physical environment of the patient are placement of patients in wards, location of sanitary services, location and adequacy of work areas, size of the ward, equipment, and supplies. Ward management of nursing care involves planning for the care of patients, supervision of workers at work, and unit management. The questions enlisted under the factors relating to the care of the patient convey some idea of the detail involved in planning for the nursing care. The amount of knowledge and skill required by the nurse is emphasized.

Regarding standards of hospital care, the author states that the needs of the patient should be the determining factor for the provision of safe and adequate care, but the extent to which these services are provided is dependent upon funds and amount of services available. The standards of nursing services depend largely upon the judgment of the nurses themselves, guided by the director. This guide attempts to identify those policies and procedures of hospital organization and management upon which the director of nursing service depends in planning individualized care of patients. An organizational chart should represent the relationship of nursing service organization to hospital organization. This chart must come about as a result of full consideration of the objectives and responsibilities of a specific hospital. Techniques of administration indicate the "tone" of working relationships emanating from the leadership ability of the hospital administrator. Effective communication is essential. A group that works well together is evidence that the leadership is motivated by respect for individuals.

Some hospitals have a department of personnel services to serve other departments by coordinating activities relating to management of personnel. Examples of policies, procedures, and performance appraisal standards are presented. A performance appraisal form is usually developed by the nursing department to apply to the performance of activities for care of patients.

Supervision and assignments are the primary factors to consider in the utilization of nursing personnel. The success of any hospital is probably more dependent upon the competency and attitudes of its personnel than upon any other factor. In considering supervision, the relationship between the leader and the workers is a key factor in establishing and maintaining an acceptable standard of nursing care. Successful supervision by the head nurse is based on her love of people and desire to assist each worker to develop his ability to contribute his best efforts to the nursing care of patients. Methods of work assignment include the functional method of assignment, the patient method of assignment, the nursing-team method of assignment, and techniques of assignment. Every worker must know his responsibilities, duties, and tasks explicitly.

Two factors involved in educational requirements are inservice education and the student nurse in the hospital. Types of inservice education include orientation programs, skill-training programs, ward-management programs, nursing-care programs, and continuing education programs. A successful educational program for a student nurse depends on the quality of nursing care practiced in the hospital. The coordination and integration of nursing education and nursing service programs are recommended.

The construction of a master staffing pattern is necessary in establishing and maintaining an acceptable standard of nursing care. Before such a pattern can be achieved, certain factors must be considered. The director of nursing services is responsible for guiding the nursing service personnel in acquiring the knowledge, skills, and wisdom • to extend nursing care to patients, • to manage personnel, • to develop and maintain good working relationships, • to provide an acceptable environment for patients and personnel, • to provide supplies and equipment, and • to coordinate all facets of nursing services and nursing care through sound administrative practices. The establishment of effective nursing service requires long-term determination, effort, and practice. Each hospital situation lends itself to a unique program of improvement of nursing care. The acquisition of nursing knowledge based on research has and is being used to solve problems of nursing care of patients.

The appendixes include:

- Organizational Chart for Hospital Nursing Services in Medium-Sized Hospital of 200-300 Beds;
- Organizational Chart for a Hospital Nursing Unit;
- Organizational Chart for Nursing Service in a Small Hospital, 50–250 beds;
- Functions of a Hospital Nursing Service;
- Some Tangible Evidences of Sound Organizational Planning for a Hospital Nursing Service;
- Daily Time Assignment Indicating Split Shifts;
- Daily Time Assignment as used for Study in One Hospital;
- Job Analysis Form;
- Position Description: Head Nurse;
- Position Description: Staff Nurse;
- Nursing Care Plans;
- Procedure—Planning a Weekly Time Assignment for a Hospital Nursing Unit.

Critique

This is a modest, unpretentious statement describing a guide to staffing. The content of the manual is applicable to staffing methodology since it identifies a number of variables to be considered in establishing staffing patterns and prediction of numbers of staff for a nursing service.

The theoretical framework for the guide is very sketchy. A short discourse is given on the uniqueness of hospital nursing services and its relationship to care of patients and physicians, to the problems of definition of nursing, and to nursing involvement in the delivery of total hospital services. There is no reference to studies on the subject of nurse staffing methodology or of any of the variables influencing the amount of nursing hours required for care of patients. The knowledge base of the guide resides in the experience of the author and her collection of the opinions of 112 nurses and physicians throughout the world.

The guide is practical. It is simply, and at times monotonously, written. Recognition is given to the influence of many variables upon staffing requirements: type, training, and competence of staff; characteristics of patients, their diagnoses, degree of illness, and special care requirements; the presence or absence and the efficiency of supporting systems; the physical environment of the patient and the nursing unit; the impact of physicians and characteristics they present; overall hospital policy and administrative practices; and quality of care desired.

These variables are not tightly measured. A few tools, such as forms and lists of questions, are provided for data collection. No evidence of their reliability and no description of their origin are included in the content of the manual. The amount of quantification is minimal, consisting of counting numbers of persons in work classes and a calculation of total hours and nursing care hours per patient. No standard of hours is recommended.

Nevertheless, for the unsophisticated director of nursing, or one in a small setting, the guide could be very useful because of the detail with which it depicts the many variables. However, the guide would not be especially helpful to the director who is attempting to obtain reliable and valid hard data for prediction or who is interested in finding a new methodology. The forms are readily reproducible. Procedures for their use are given in simple directions. The cost is small.

C15. Rueckert, John E. "A Brief Review of 'Facts,' Formula Analysis and Control Technique for Staffing." Management Engineering and Cost Control Service, Princeton, New Jersey, 1969. (Mimeographed).

Review

Two aspects in gaining equitable staffing patterns are a consideration of work distribution and the assignment of work. Work must be distributed to the *appropriate* person and yet appropriately distributed in terms of time. The key is to define the objective, spell out the tasks to be accomplished, the level of the workload over the time available, and then to assign the tasks to the proper category of personnel. Once this degree of work control is achieved, it is possible to construct an accurate record and control of specific accomplishments and how these accomplishments relate to the manpower hours worked. Through various methods of work measurement, realistic staffing patterns can be established.

The system, designed in New Jersey and being implemented in hospitals that participate in the Management Engineering Services of the Association, is set to forecast and validate the actual staffing requirements. It is an illustration of a legitimate control system. It relates the changes in staffing patterns to the nature and volume of work changes. Every step of the program has been reviewed, criticized, and ultimately approved by a Committee of Nursing Service Directors. FACTS is based upon the development of a comprehensive manual of nursing tasks. Time standards have been extended and revised under the guidance of a nursing committee and $30,000 worth of engineering studies.

The frequency of tasks standards is obtained by around-the-clock studies, 7 days a week, on every patient on one or two nursing units for a period of about 2 weeks. What is done and *what should be done* for each patient are determined by nursing personnel and management engineerings working together.

This formula system differs from the typical three or five level category system. It determines individual patient care values rather than averages of all patients in one category. A patient in Category III may need as little as 4 hours or more than 10 hours of care. A patient with several checks for Class II items may require significantly more care than a patient with one check on a Class III item. These findings agreed with those of John Young who, in a doctoral thesis at Johns Hopkins University, found that total care time was based more on the cumulative effect of various combinations of care requirements than on the strength of one factor.

A care value for each individual patient can be based on three factors: basic, routine, and special care. Basic care includes such items as admitting and discharge procedures, a.m. and p.m. care, linen distribution, rounds, routine TPR's and water, various paperwork requirements, etc. Routine care is computed as an average for each patient based on actual data and includes such tasks as adjust bed, back rub, mouth care, make bed, etc. Special care is determined for significant factors with a specific value for each factor such as baths (self, partial, or complete), feeding (partial or complete), IV, incontinent, dressings, transportation, etc.

Special care requirements are checked for each patient each day, similar to the category system. The difference occurs when the FACTS system adds specific care values for each item to generate a specific value for each patient. This system recognizes the significant variables that create changes in manpower inputs in order to really control costs.

Critique

In developing staffing methodologies and approaches, various modifications have been made of the work of others. This report of the Management Engineering Services of New Jersey Hospital Association utilizes engineering techniques of work measurement. It is different from other approaches because of its attempt to include in the analysis of the basic data *what should be done* as well as what is done.

Unfortunately, this paper does little to give one a picture of the methodology. There is no outline of the approach as it is applied to hospital nursing services. The figures are untitled, do not include explanations, and their derivations are not given. Therefore, the paper cannot be readily translated into use.

However, the first five paragraphs present an excellent statement of the rationale upon which the approach is based. This alone makes this document valuable to the individual looking for a feasible and rational methodology.

C16. Rueckert, John E. " 'Facts' for Nursing Staffing." Management Engineering and Cost Control Service, Princeton, New Jersey, 1969. (Mimeographed).

Review

Purpose.—FACTS is a system known as the "Formula Analysis and Control Technique for Staffing." FACTS is capable of determining the appropriate care time for each individual patient every day, eliminating the compromises and potential invalid category and 'arbitrary point' systems. The system can generate care standard from 2 to over 10 hours per patient per day.

Rationale.—The FACTS system resulted from the data analysis and systems design of the Management Engineering and Cost Control Service (MECCS) started in 1960 by the New Jersey Hospital Association and the Hospital Research and Educational Trust of New Jersey. MECCS operates solely on the support of participating hospitals. FACTS is the first result toward providing comprehensive and valid quality and manpower utilization systems and controls for all hospital departments.

Each step in the nursing program was a joint effort on the part of nursing professionals and management engineers. A nursing project guidance committee consisted of seven registered nurses, who were directors of nurses. This committee reviewed, criticized, and ultimately approved all details including quality criteria, procedure documentation, task time determinations, study methodology, measurement techniques, and control system design.

The systems consists of five major phases as follows: quality control, utilization input requirements, data gathering techniques, analysis and system design, and implementation.

The MECCSs Quality Control Plan was derived from material generated by CASH. A checksheet is provided for the nursing unit, the chart, and the patient. Each sheet lists 20 or more quality criteria statements, many of which are described in terms of acceptable standards. Inspections are made on a random sampling basis; "yes" or "no" decisions are made for each criteria. A numerical index is computed by dividing the "yes" inspections by the total inspections. This index can be plotted for continuous control purposes. The concept content and format were acceptable to the Nursing Committee. MECCS decided to use an "absolute" accuracy approach rather than a relative accuracy approach. Thus, the Nursing Committee accepted an error limit of ± 10 percent throughout the range of possible sample results. This yielded a larger error range potential at lower quality levels, yet gave a reduction of the total number of samples to a manageable seven rather than 20. Only five samples are needed to achieve the required accuracy level where the sample results exceed 75 percent. This plan includes most of the elements generally included in nursing audit procedures, providing an objective manner in documenting specific occurrences. Each observation marked "no" (unacceptable) provides an effective feedback system for corrective programs. Experience with this program shows that the quality index will be in the 60 to 80 range when first calculated and climbs to 90 percent to 100 percent within a period of several months. The sampling should be continued after the unit attains the 90 percent mark to prevent losing the advantages that were recently gained. Specific sampling plans are based on personnel participation, organization, and reported mechanisms recommended by the engineers for each specific hospital.

Four inputs are required for this comprehensive study of manpower utilization. These are • documented, standardized procedures; • standard times associated with each specific task; • workload volumes, frequencies, time of occurrence and time sensitivity; and • personnel category that should perform each task. All currently available material on procedures and task times was reviewed by the Nursing Committee. The inclusion of material was based on the following criteria: • it reflects current appropriate nursing practices, • it covers alternate methodology of acceptable practices, and • it includes specific procedure sequence and content with clarity without becoming excessively clinical. Engineers established the following criteria to be used in order to obtain accurate and reliable results: • procedures must have a count unit identified, • procedure task-time standards must be mutually exclusive, and • time standards must be accurate and backed by basic reference data. Direct time studies with effort ratings and MTM (Motion Time Measurement) have been used to establish task-time standards. All procedures are classified as to task content and optional elements. Development of the procedure manual involved over $30,000 of engineering time plus large contributions by the Nursing Committee and many other nurses. The engineer reviews all of the procedures and task time data with nursing personnel and makes specific changes required for an individual hospital. The engineer records who should perform each task as determined by the Nursing Managers on the Task Information Summary Sheet. The Nursing Project Guidance Committee reviewed each task and created tentative acceptable alternatives for task assignment. Each task is also clarified as to time-sensitivity on the Task Information Summary Sheet. It must be determined which tasks must be performed at a certain time and which can be used. The time-sensitivity coding of tasks provides data to achieve leveling purposes.

Sample.—The data for task frequencies and occurrence times are based on around-the-clock, 7 days a week, observation of every task performed for every patient for a 2-week period.

Instruments.—Four forms used for data collection in a hospital are • a bedside tally sheet for routine care, • a chart used by engineers and nurses for special care, • medication chart filled in by medication nurse, and • activity record carried by each employee. The Routine Care form includes a listing of tasks that are relatively minor in nature and collected by tally at the patient's bedside as these tasks are performed. Care requirements, based on what *should be done for every patient,* are recorded on the Special Care Sheet. The engineer and designated nursing personnel review (and construct if necessary) the record that is completed by the medication nurse using a coding system for the number and type of medication. The Activity Record is provided to all nursing personnel on the unit to record time for and nature of unusual or questionable activities such as delays, waiting time, special requests for patients. A complete list of non-nursing tasks and of avoidable and unavoidable delays results from this study. All of the recorded tasks and frequency data are evaluated according to task-time standards that have been previously established.

A large group of nursing service directors developed a list of criteria that could be used to evaluate various staffing system approaches.

The conclusion was reached that the only approval that could provide accuracy and validity was one that could determine daily care values for every individual patient. FACTS is a formula system containing a specific value for each patient's care requirements based on the value of *special* care needs plus *basic* care allowances. A constant value of daily care generated for all patients is the average of the insignificant variables determined from the routine care data forms. The data from the special care form provide the information required to identify significant variables to be used for the daily care value for each special care factor. By adding the values of basic care to the values of all special care factors that apply, the special care value for each patient, each day, is determined.

Procedure.—The mechanics of operating the system and the derivation of manning tables and controls are presented. The FACTS sheet on each nursing unit is similar to the check-off category systems approach, requiring 10 to 15 minutes per nursing unit per day. First, the checkmarks are totaled across the page; i.e., eight complete baths, 16 partial baths, etc. The value of each special care factor is applied to the number of patients for that factor, generating a total time for the factor. Total patients times the basic allowance per patient plus the total special factor-time equals the total nursing hours for the unit. Second, the total nursing hours per day per unit are converted to personnel mix requirements. A specific, fixed percentage of professional nursing and ancillary personnel time is impossible because the individual who performs a task may depend on a patient's condition and some tasks may be performed sub-optimally for convenience or practicality. A minimum level of registered nurses' time is computed on the basis of time associated with all tasks that can be done only by the registered nurse. The maximum registered nurse requirement was based on the assignment of "anybody" tasks to specific categories of personnel in proportion to the amount of time already assigned directly to each category. This range concept also provides a knowledge basis for deciding how to round off fractional figures to meet whole person requirements. The entire procedure can be done in the nursing service office in 10 minutes per day per unit.

A check for systematic error was instigated and sampling tests applied. Actual care requirements exceeded those forecast by 7 to 9 percent. This error measures additions, deletions, and changes in care requirements that occur between the time of the forecast and the delivery of service. This error was compensated for by building the appropriate allowances into the manning tables that convert hours to people by category and shift.

Results.—Staffing assignments will be adjusted to provide equitable coverage to all units according to the FACTS sheet forecast of total personnel that assignments are unfair. When undermanning exists, assignments can be made in equitable proportions. When staffing needs are below average, on call personnel can be restricted. Data showed that a 100 percent variation in actual staffing existed on two similar units.

Systematic scheduling is strongly advocated. This is done by analyzing the daily total care histories and determining the statistical minimums and maximums staffing needs. Basic groups of personnel (full-time, competent) are scheduled for each unit to meet minimum staffing requirements. Supplementary personnel are subject to movements between units depending on need and are used to cover all potential variation requirements such as absences and holidays. Personnel are called only when excessive care needs or staff shortage occurs. The systematic establishment of cyclic scheduling enhances the objective measurement of care variation by FACTS.

A report is issued each payroll period, comparing standard staffing to actual staffing (payroll data) for each nursing unit. The variation between standard and actual indicates the appropriate management inquiry and correction action that are necessary. The standard can be used as justification for difference between budget forecasts and actual staffing.

The system creates documented standards for each hospital. These standards have yielded such results as identification of understaffed conditions in one hospital to a saving of $300,000 on seven nursing units in another hospital.

Budgets can be based on accumulated standard hour data. Proposed revision in service equipment or systems can be made accurately and quickly by using the supporting standard data. Trends can be determined from standard hour data.

Average per diem reimbursement is the absolute opposite to standard unit costing, and true cost control will begin only when these servicing and productivity differences are measured, justified, and reimbursed. The success of a unit cost system is the identification of significant variables and the continuous measurement of the impact these variables have on staffing requirements and cost.

It is believed that the new data gathering approaches, the refinements in new insights into analysis techniques, the system design that generates individual patient care values instead of categories, and the resultant simplified recording and staffing techniques represent significant improvements over previous systems approaches.

Critique

This guide has been set up to describe a program that is a modification of that designed by CASH.

The writing is fluent and yet restrained. The contents indicate limitations of the program and the author carefully describes the concepts and the logic underlying the application of management engineering to the study of nursing work. The statement of rationale is drawn directly from work measurement. Little is contained to support the concept of nursing practice as possessing major elements from the basic social services.

Unfortunately, the guide is lacking in exhibits. Figures, forms, listing of criteria, and the manual of nursing procedures were missing. Therefore, this guide cannot be used without consultant help. However, the contents of the guide are more logically and thoroughly developed than the majority of publications that have been read.

C17. "Systems for Control and Analysis of Levels of Effectiveness, Nursing Staffing Program." Hospital Systems Improvement Program, University of Michigan, Ann Arbor, Michigan, (no date).

Review

The groundwork for this program has been provided by CASH. The results of related research efforts from the University of Michigan Bureau of Hospital Administration and the Johns Hopkins University have been incorporated.

Purpose.—SCALE Nursing Staffing Program has two objectives:

- to establish objective standards that will allow nursing personnel to accurately predict staffing requirements; and
- to provide nursing personnel with an objective means of self-evaluation with respect to staff utilization.

Methodology.—Development of basic staffing standard for each hospital includes use of standard data and a form to identify those nursing procedures for which the variance in frequency of performance from hospital to hospital may be significant. "SCALE provides a Nursing Procedures Manual documenting the procedures upon which the standard times are based." "These figures have been found to be sufficiently accurate in most hospitals. . . ." The Nursing Steering Committee is encouraged to test the accuracy of standard time for each procedure by using intuitive judgment. The average percentage of patients requiring a certain procedure and the frequency of performing of this procedure are based on an average adult medical-surgical patient under 65 years of age.

If the Nursing Steering Committee (consisting of nursing administrative and supervisory personnel for each hospital) does not agree with the Standard Data, a SCALE engineer will (a) supervise an investigation in the hospital to determine the average percentage of patients requiring a given procedure and/or the frequency of performance; and (b) review the existing procedure with nursing and perhaps improve a procedure and establish an acceptable time standard. (There is no information indicating the method of implementing these two goals.)

To establish the basic staffing standard for each hospital, the hours per patient day (data from the standard form and the adjusted form) are compiled and an adjustment for patients over 65 years of age is included.

Development of the staffing hours guide is based on categorizing patients in terms of individual care requirements. Category II, partial care, represents the average medical-surgical patient to whom a basic staffing standard applies. Criteria for patient classification include degree of ambulation, type of bathing required, independence of feeding, level of orientation, and other (oxygen, isolation, unconscious, etc.). Research results from the University of Michigan Bureau of Hospital Administration and Johns Hopkins University indicate that when patients are classified by the described system included in this report, the relative staff requirements for the three categories of patients are as follows: "For every 1.0 hours of nursing staff time required by a Category II—Partial Care patient, 0.5 hours of nursing staff time are required by Category I—Self-Care patient and 2.5 hours of nursing staff time are required by a Category III—Total Care patient."

The Staffing Hours Guide for an individual hospital is generated by combining the basic staffing standard with the patient classification system or Hours = Census × Category Multiplier × Basic Staffing Standard. For example: one partial care patient × 1.0 × 4.0 hours/patient day = 4.0 nursing hours per patient.

To develop a Personnel Guide, a SCALE engineer will analyze historical data of each hospital to determine existing staffing patterns. "As a point of reference, CASH study in a number of California hospitals showed the following average allocations." (Allocations according to shift and personnel category are included but no details of the study upon which they are based.)

From the monthly nursing hours report, which includes the beginning census in each of the three patient categories and the total actual nursing staff hours used, the SCALE Program will supply a Nursing Staff Utilization Report.

Critique

This is the translation of research reported to have been done by CASH, University of Michigan, Bureau of Hospital Administration and Johns Hopkins University, with a program that is applicable to hospital nursing in Michigan. The program is described. However, no research findings are included to support:

- time standards set for procedures and for hours of care per patient;
- frequency of patients receiving procedures, set as examples, from CASH;
- definitions of "average" experienced personnel or "average" medical-surgical patients;
- calculation of factors to allow for personal time, fatigue, unavoidable delay, or for patients over 65 years of age;
- adjustment factors representing the correlation between staffing requirement and patient mix;
- classification of patients; and
- standards for different periods of the 24 hours.

This is staffing based primarily upon time methods and physical task orientations. The variables of supporting services are only briefly alluded to and no consideration is given to variables such as physical environment and variations in staff experience.

The manual is not written in sufficient detail that it is usable without assistance from consultants. Procedural details are lacking.

C18. Systems for Control and Analysis of Levels of Effectiveness. "A Quality Control Plan for Nursing Service." Hospital Systems Improvement Program, University of Michigan, Ann Arbor, Michigan, (no date).

Review

Purpose.— • To provide an objective measure of the quality of nursing care and service; • to provide a means of self-improvement through the continuous feedback of information to staff personnel regarding quality levels.

Methodology.—The Hospital Systems Improvement Program (HSIP) has incorporated the basic concepts of the CASH program.

The quality of nursing care is proposed to be measured by completing checksheets containing questions that can be answered "yes" or "no" by nursing administrators or supervisory nurses. The questions relate to the patient and his immediate environment, patient welfare and safety, patient comfort and accessibility of immediate treatment of his needs, and patient room condition. These questions vary with the type of patient unit. A questionnaire concerning the patient's chart and the nursing unit are the same for all patients sampled.

A random sampling schedule telling when and where the questionnaires are to be completed is provided by SCALE. The feedback information is based on a quality control index (QCI). "This index indicates the percentage of questions answered in the affirmative." (The actual percentage or method of arriving at quality control is not included in this manual.)

This manual is primarily concerned with the implementation of the SCALE program. There is no description of methods involved in the actual construction of the questionnaire or of the results of determining quality of nursing care.

Critique

This is a description of the program designed to assess quality control of nursing service. It draws upon the work by CASH, but includes no supporting data from the CASH studies. The program, SCALE, itself, as written, presents its own limitations in that the questions posed in the instruments included are not answerable "yes" or "no." Definitions of qualities to be determined are not given. Furthermore, some of the situations being evaluated could, in some settings, be the responsibility of departments other than nursing.

There is no content in the manual describing the selection of items and the construction of the questionnaire and presenting evidence of reliability of the questionnaire.

C19. Scottish Health Service Studies, No. 9. *Nursing Workload per Patient as a Basis for Staffing.* Scottish Home and Health Department, 1969.

Review

Purpose.—The manual was written to show the development of a formula used in calculating nurse staffing requirements. The report also presents a confirmatory study to check the validity of the formula.

Development of the Staffing Formula. The basic information used in the development of the formula was derived from a survey described in Scottish Health Service, Report No. 3. Briefly, the survey was regionwide and activity sampling was used. A team of seven senior nursing staff assisted the Work Study Department of the region in making the survey. During the survey, patients and personnel in 46 wards, five operating theaters, and two outpatient departments were observed. (There was no mention of the number of hospitals included.) Teaching and nonteaching wards were included in the survey.

An Advisory Group was organized, comprising the regional nursing officer and matrons of various hospitals in the region. This group's purpose was to define an acceptable standard of patient care and to define the duties appropriate to the various grades of nursing staff. The standard of patient care and duties delineated by grades of nursing staff are described in greater detail in appendixes A and B.

The development of the formula resulted from an analysis of the information received from the original survey. The first set of information to be analyzed dealt with classifying the dependency of each patient. Patient dependency was noted each day and was categorized. The categories ranged from bedfast/chairfast/totally helpless to totally ambulant. A more detailed description of these classifications is shown in appendix C.

The basic information for the development of the formula was gathered by an analysis of each unit. This included time spent on each category of the nursing duty in relation to the specialty of the ward and to the numbers of the patients in the various dependency categories. This information enabled calculations to be made concerning the time spent per patient in giving services and the frequency of the services.

The categories of nursing duties as defined by this report are: basic nursing, technical nursing, ward administrative, domestic work, and miscellaneous.

The work of the different grades of nursing staff was compared to the duties appropriate to that grade as defined by the Advisory Group.

The standard of patient care proposed by the Advisory Group and the analyzed results of the survey were compared. The standard of patient care in the wards was consistent with the Advisory Group's definition. It was decided to use the recorded information regarding basic nursing in these wards as a standard when deciding on the time required to maintain the level of basic nursing.

The report suggests that, if the time spent on basic nursing is accepted, it should be possible to relate this time to the patients in the ward by using the dependency categories. It should also be possible to apply factors to groups of patients so that the actual number of patients in the ward may be converted to a smaller equivalent number of fully bedfast, totally helpless patients. For example, the factor 1.00 could be given for the totally helpless patient and the number reduced as the dependency of the patient decreases.

Various combinations of factors were tried by the investigators, and a constant figure of basic nursing time per week equivalent to the fully helpless patient could be evolved. However, it did become apparent that time spent on female patients was consistently higher than time spent on male patients. With the acceptance of this idea, the survey's patient dependency factors were developed. These figures give a relatively stable figure for basic nursing care equivalent for the totally helpless patient.

The dependency factors were checked and found to be applicable in all units studied except geriatrics. In geriatrics, it was found that there was a reduction of the dependency factors due to the reduction in the frequency of work involved with admitting and discharging patients. Reliable dependency factors developed when the reduction of admitting and discharging was offset by the extra work in two other categories.

The time for basic nursing corresponded with the nursing care given to patients in all wards studied except maternity, nonnurse-training, and geriatric wards. The explanation for this was the standard of patient care contained in a built-in allowance for the fact that student nurses receive tuition from staff while performing nursing duties. While they are doing them on their own for education purposes they may need more time to become proficient in the skills later used.

The analyzed results of the survey gave information relating to the actual time spent on technical nursing duties. This time element was considered in several different ways: • by dividing the time by the actual number of patients on the ward; • by dividing it by the equivalent number of totally helpless patients on the wards (using dependency factors); • by quoting it as a percentage of the actual basic nursing time observed; and • by quoting it as a percentage of theoretical basic nursing time; i.e., the average time from the two figures calculated above.

The analyzed results showed that the technical nursing time could be quoted as a percentage of the theoretical basic nursing time, the figure varying with the type of specialty. No information was given to support the choice of determining the technical nursing time.

The technical nursing percentages were found to be comparable on similar teaching and nonteaching wards.

The report suggested that it was possible to correlate the nursing care given with wards that had been studied and to make due allowance for the technical nursing required for that specialty.

Administrative duties were timed and recorded throughout the survey. The time was divided by the actual number of patients on the ward to give a time per week per actual patient. An allowance was made for the type of hospital since the training of nurses was included under the heading of ward administration.

The time involved in domestic work was also considered. A previous study directed by the Work Study Officers of this project gave guidelines as to what designated domestic work. This time was computed as previously; that is, as time spent divided by actual number of patients.

Miscellaneous duties were also included in the breakdown of nursing duties. It was difficult to set a standard due to the fluctuating of these duties. The time was computed from information obtained from a questionnaire completed by the ward sister.

A simple formula for calculating the nursing workload for a given ward was derived when the average patient dependency per ward was used instead of using the equivalent number of patients for each ward. It was decided to simplify it further by using the average number of actual patients per ward and the average figure for basic and technical nursing time.

Tables were compiled showing the standard data regarding the factors of the formula and are presented with the report.

From the computation sheet the nursing workload can be calculated by multiplying the average number of patients in the ward by the allowed time per patient. The computation sheet provided for adjustments for layout factors and additional duties.

The proposed staffing was arrived at by dividing the weekly workload by 42 hours to give the number required to staff the ward. Staffing by the various grades was accomplished by considering the amount of technical nursing required by the patients and the duties appropriate to the various grades of nursing staff.

Confirmatory Study. The formula was a means of calculating staffing requirements but the technique of the original survey, activity sampling, did not check the formula.

Purpose.—Two male wards of the Nightingale type, similar in function and in layout, were chosen. The first ward was staffed at the level appropriate to the hospital and the second was staffed according to the results of the formula.

Procedure.—Continuous observation was used. One observer was with each staff member at all times. All recording was done to the nearest minute. Sheets were designed so that the time for each operation could be recorded and a space for writing a description of what the staff member was doing. Code numbers were used wherever reference was made to a patient.

The classification into dependency categories had been criticized due to its subjectivity so classifying of patients was conducted in the following manner: a dependency sheet was filled out by a reserve person of the study group while the deputy of the ward was filling out a duplicate. These sheets were compared daily by the Work Study Officers and arbitration was used to settle differences.

Analysis of data.—There were two separate methods of analysis. The basic and technical nursing duties were analyzed on an individual basis, but the administrative, domestic, and miscellaneous duties were analyzed for the ward as a whole.

The nursing work was broken down into the 81 categories used in the original survey. The Work Study Officers entered the job category number and the time spent on the job against the entries on the sheets completed by the observer. Then, the times were transferred to a separate analysis sheet. In the case of basic and technical nursing, a sheet was prepared for each patient each day. On the sheet under the job code number, the frequency of care and grade of staff member were also recorded. A different colored pencil represented each grade of staff. One sheet was prepared for the ward as a whole for administrative, domestic, and miscellaneous duties. The same recording and color systems were used.

Results.—The results of the confirmatory study for basic nursing time showed that all figures for Ward 2 fall within the calculated range of the original survey. But Ward 1 only falls within the results of the original survey in two patient dependency categories.

The technical nursing time presented a conflict. The time for Ward 2 was lower than Ward 1. The wards had been chosen on the basis that they were similiar medical wards, but there was a difference in the clinical content. There was also a marked difference between the technical nursing requirements of emergency admissions to the wards during the survey. This in part explained the reason for the range of technical nursing in the original survey. The second survey showed both wards were within the established range.

The time spent on administrative duties was at the low level of the range of the original survey. During the original survey, clinical instructors were available for ward instruction and this was classified as an administrative duty. But in the confirmatory study there were no clinical instructors. The report states, "If more time had been spent on ward tuition, this would, in all probability, have brought the figure nearer to the one in the original survey."

Analysis of the results of the original survey showed that more time was being spent on domestic duties than in the confirmatory study. It was felt that if a reduction of nursing staff time with these duties could develop, then the time on domestic duties could be reduced in the formula.

The miscellaneous duties time was quoted as a percentage of the actual time spent on basic and technical nursing, administrative duties, and domestic work. Ward 1 was 1 percent down the standard while the percentage of Ward 2 was .12 from the formula figure.

This report concerned itself only with the nursing duties for day staffing and made no mention of ward staffing for night duty and the staffing of other departments.

The report stated that "no formula can be worked out for calculating ward staffing at night," because night staffing must be based on the consideration of the numbers required to give adequate service, with the provision that qualified staff be available.

Information regarding staffing from the original survey led to calculations of staff requirements in both operating theater and outpatient departments. Calculations for the overall staffing requirements are shown.

Limitations of the study.—First, although the validity of the formula was proved, the figures may not be applicable to all hospitals. Second, the average dependency factors and the technical nursing percentages may vary with clinical area or changes in the function of the wards. Any alteration in the standard of basic nursing care may necessitate a change in the time allowed for basic nursing care. The times allowed for administrative, domestic, and miscellaneous duties may not be in accordance with usage elsewhere. The tables should be checked to see if they are applicable to the particular ward.

The appendixes include a description of the standard of basic nursing care, a list of duties appropriate to various grades of staff, a list of factors relating the patient dependency, computation sheets to calculate the workload, and tables showing standard data regarding the formula factors. Graphs are included showing the results of the original and confirmatory studies. The appendix concludes with the breakdown of proposed staffing for a 605 bed hospital.

Critique

This bulletin is an outgrowth of the survey reported in Scottish Health Service, Bulletin No. 3, *Nurse's Work in Hospitals in the North-Eastern Region*. One of the outcomes of the survey was given as "a formula had been developed which allowed for the calculation of the day duty nurse staffing requirements of any ward, making due allowance for the type of hospital, the speciality of the ward, and the size and layout of the ward" (p. 3). The present bulletin, No. 9, "traces the development of the formula and steps taken to check it."

In the earlier study, the advisory group had developed standards and listings of duties performed by grades of personnel. Some of the wards in the hospitals studied met these standards. Therefore, the rationale for the formula development was based upon the data collected since the standards were acceptable.

This guide includes a brief statement for evolving the formula for calculating the nursing load for a given ward. The formula is stated as:

$$W = N \quad [F(B+T)+A+D+M]$$

Where: $W =$ Average weekly nursing workload in hours
$N =$ Average number of patients on ward
$F =$ Patient dependency factor for ward specialty
$B =$ Time in hours per week required to maintain the standard of basic nursing care for a totally helpless, bedfast patient
$T =$ Time required for technical nursing of the ward specialty expressed as a percentage of the time spent on basic nursing
$A =$ Time per patient per week for administrative duties
$D =$ Time per patient per week for domestic work
$M =$ Time per patient per week for miscellaneous duties

A large part of the manual is devoted to the derivation of the formula through the analysis of the survey information and the resultant standard data. The use of the formula, the tables, the computation sheets, and the various adjustment factors comprise only a few pages. However, the directions are specific; the tables and other exhibit materials are easily understood. The final chapter briefly describes the calculation for the overall staffing requirements of a hospital and gives examples.

Also included in the manual is a description of a study to test the formula, by a matched two-ward design, using continuous observation of the nursing work. The method for the determination of staffing requirements and the amount of staff were the experimental variable. In this confirmatory study, information regarding the training of observers is missing. The procedure for categorizing patients differs from that used in the original survey. The results, however, were interpreted as establishing the validity of the formula.

The manual is well written. It is best understood following a review of the original survey. The innovative features of the formula are several: • the use of standardized data drawn from a relatively large sampling is sound, • there is an attempt to relate basic nursing and technical nursing in a ratio, • established standards of basic nursing care for the totally helpless bedfast or chairfast patients are expressed in terms of the frequency with which certain types of care are performed, • the variables of clinical types are included in the calculation of hours per week per patient, and • factors for layout and supporting services are considered.

There is weakness in the approach. Reservations about the reliability and validity of the original data are in order since little is known about the preparation of the observers. The sampling procedure for the wards is not clear. Likewise, the computation of the factors dealing with layout and supporting services is vague. The tasks included in the basic and technical nursing are well defined.

In spite of these limitations, the methodology is a serious attempt to weigh a number of highly pertinent variables, and it merits consideration for use in hospitals.

C20. U.S. Department of the Army. *Staffing Guide for U.S. Army Hospitals*. Pamphlet No. 20–557, February 1964.

Review

Purpose.—To provide guidance for determining number and kind of personnel required to operate U.S. Army Hospitals of varying sizes and workloads. Yardsticks are designed to serve as guides in determining the number of personnel for performing functions, to be used by U.S. Army Hospitals except those under the jurisdiction of the Surgeon General. They may be used in overseas hospitals when applicable and may provide specific uses at higher headquarters in evaluating the personnel requirements of U. S. Army Hospitals.

Qualitative staffing information is designed to aid in staffing U.S. Army Hospitals at the installation level and in properly identifying positions in hospital tables of distribution. This information is based on field analysis of hospital jobs, function, and organization. It includes precise skills required in terms of appropriate military occupational specialty for each position, duty titles (descriptions of work performed), appropriate grades in accordance with skills performed and responsibility involved, and appropriate distribution of positions at each staffing level. Categories of personnel, military or civilian, are identified. For civilian positions and appropriate civilian counterpart, position letter and classification code (U.S. Civil Service Commission) are shown. In addition, positions are identified as to current predominant incumbency and Department of the Army staffing objectives in accordance with A.R. 616–1.

Method.—Applicability of the staffing guide is outlined to include: (A) Personnel authorized by a manpower authorization voucher or obtained from other sources, except personnel paid from nonappropriated funds. Normal allowances for annual and sick leave, training and orientation time, and military duties are included. (B) Operating situations: (1) Yardstick allowances are intended as guides in the determination of personnel requirements. (2) The staffing guide does not constitute an authorization for personnel; fewer positions or more positions may be required. (C) Conservation of mapower. Yardstick allowances are purported to contain the best of prevailing manpower utilization practices in U.S. Army Hospitals. Management improvement programs should result in increasing efficiency.

Use of the staffing guide is outlined: (A) As tools for determining personnel requirements for U.S. Army Hospital functions in utilization surveys in accordance with A.R. 616–1. (B) Workload data gathered for other purposes may be used to supplement yardstick data. (C) Army management structure account codes included in yardstick codes provide local commanders guidance in determining how they may collect, organize, and record minimum manpower and workload data. The codes aid in the consolidation of data into broader totals for reporting purposes.

Revision of staffing guide procedures are outlined: (A) Survey report data are used to revise periodically the hospital staffing guide. The reports include current activities and organizational factors, workloads, work units, and number of personnel utilized. Yardstick codes and yardstick allowance computations, description of the work, and kinds of positions are included. (B) New yardsticks are established when justifiable information proves the need. (C) Yardsticks may be refined based on work units where workload data are available. (D) Data may be submitted directly, in addition to the survey report forms, for revision of the staffing guide.

Use of the staffing guide is described in section II. Yardstick code structure is described and is shown in chapter 2. Chapter 2 is arranged in a series of staffing sections, each representing a major element of the U.S. Army Hospital. These elements are identified numerically in accordance with the yardstick code structure developed for this activity. Content of the staffing sections are defined: (A) Organizational titles for the administrative elements and professional elements are listed. (B) A U.S. Army Hospital organizational chart is shown in figure 2. Yardstick code numbers are shown in each block that indicates the yardstick code series applicable to major organizational element these numbers may be used to refer to staffing tables for each major element. (C) Staffing tables, parts identified in the figure, provide guidance for determining appropriate numbers and kinds of personnel for performing various functions of each major organizational element, within each staffing section. Parts included are (1) Table title and number that identifies the function, (2) Types of yardsticks: (a) work unit type indicates personnel allowances in relation to work units at various workload levels based on monthly figures. Allowances for levels falling between those indicated are computed by interpolation-extrapolation, (b) single staffing figure type based on research and provisions of applicable regulations, (c) local appraisal based on local determination not shown; (3) Military duty position letters listed in the staffing tables are descriptive of the positions performed; (4) Officers' branch position is listed by code; (5) MOS code indicates the appropriate occupational classification of the position; (6) Grades of officers positions are shown in the staffing tables based on an analysis of skills, knowledge, duties, and responsibilities of each position; (7) Incumbency codes indicate type of personnel that should be utilized in each position in accordance with position determination criteria established at Headquarters, Department of Army level. These are based on experience and background requirements, availability of personnel, etc.; (8) Category code indicates type of personnel that may be considered for utilization in each position; (9) Civilian counterpart positions are listed and coded for each military position; (10) Explanatory or qualifyng footnotes to supplement information in the staffing are provided; (11) A brief description of work performed is included; and (12) Common work units are defined: (a) operating beds, (b) occupied beds, and (c) patients remaining.

Appendix I presents computation of personnel allowances by interpolation and extrapolation. Purpose, workloads falling between indexes shown, and staffing may be determined by arithmetic interpolation. For workloads falling below or above those indicated in the yardsticks, personnel allowances for workload levels are computed by mathematical extrapolation. Procedure methods are described. Computations for personnel allowances for periods other than a 40-hour week are described in appendix II. Criteria for determining suitability of Profile C, WAC, and civilian personnel in hospital positions are given in appendix III. Personnel category codes are assigned.

Critique

This guide is designed specifically for use in military hospitals. Staffing requirements for all hospital departments are presented in chart form, referred to as yardsticks. One section presents a nursing service staffing guide. Development of the yardsticks is based on data secured through field analysis of hospital jobs, function, and organization. This information is not included in the guide but is briefly described. The guide is concerned with numbers and qualifications of personnel in relation to skills performed and responsibilities involved to perform a given job. Brief descriptions of work performed are included but are insufficient to provide a basis for staffing requirements. Mathematical computations of interpolation and extrapolation for personnel allowance are described. Quality of care is not discussed.

The guide is undoubtedly useful for the purpose intended but does not include sufficient data to determine its value for a discussion of nurse staffing methodology.

C21. U.S. Department of the Army. *Yardstick for Measuring Personnel Requirements in Class I, U.S. Army Hospital.* Pamphlet No. 20–507, October 1954.

Review

The pamphlet was written to explain the yardstick code for determining the number of personnel required for performing functions of CONUS Class I, U. S. Army Hospitals.

Purpose.—The yardstick was designed to serve as a guide in manpower surveys for determining the number of personnel required.

Rationale.—This yardstick parallels the standard Class I hospital organization prescribed in SR–40–610–5. A yardstick code is provided for suborganizational element, function, or personnel group for which separate measurement of personnel allowance is required. Not all yardsticks, however, specify personnel allowances. Appropriate identifications of positions provided under hospital yardsticks may be found in *Staffing Guide for U.S. Army Hospitals* (DA PAM 20–557). The information contained in the Staffing Guide may provide a useful perspective to manpower surveyors in solving problems concerning personnel allowances.

DA Form 140–7 was used for submitting reports of manpower utilization surveys conducted of CONUS Class I, U.S. Army Hospitals.

The Assistant Chief of Staff, G-I ATTN: Manpower Control Division, has furnished experience data in cases of yardsticks that exist, but they are inadequate or confusing.

The terms used by the yardsticks and defined in the pamphlet were operating beds, occupied beds, patients remaining, and local appraisal.

Instrument.—The instrument was described for its use in determining staffing. The workload used in determining personnel allowances under a given yardstick code was the calendar month preceding the date of the survey. If the workload was not representative of average performance, an appraisal was determined from the workload data in Section 8 of Schedule X (DA Form 139). Yardsticks were expressed in terms of a series of indices which indicates personnel allowances at given levels of workload. Interpolation or extrapolation was used to determine staffing when workloads fell between, above, or below indices shown.

When the manpower requirement was based on "shift-staffing" or for staffing requirements other than 40-hour weeks, a space allowance was computed. Space allowance is the decimal of the fraction of hours per week worked over 40 hours. No other rationale for the use of space allowance was given.

The total staffing requirement was computed by multiplying the space allowance by the personnel required per shift, as determined by the application of the yardstick or local appraisal.

Results.—The yardstick codes and personnel requirements were presented relating to 14 personnel groups. The groups were command and staff, personnel division, food service division, supply and service division, medical records and office services division, medical service, outpatient service, surgical service, psychiatric and neurology service, physical medicine service, radiology service, dental service, and nursing service.

The following example is representative of the results presented:

Nursing Service—Office of the Chief Nurse

Yardstick—operating beds	50	100	200	400	600	1,000
personnel	2	2	2	2	3	3

Definition—Providing administrative and technical supervision of nurses.

Tables were presented that represent the total personnel staffing of surgical, medical, and neuropsychiatric wards for a 7-day week and a 40-hour week per person.

Critique

This pamphlet is designed to serve as a guide in manpower surveys for determining the number of personnel required for performing functions of CONUS Class I, U.S. Army Hospitals (station hospitals).

Yardsticks have been determined for normal conditions at hospitals having average facilities and operating at average workloads. Methods for assessing personnel needs are not included. Considering that this pamphlet is designed as a guide, methods for adjusting personnel needs when workloads change are rigidly outlined. These methods were made by a manpower analyst and computed by arithmetic interpolation or extrapolation. Personnel requirements are outlined for all of the usual positions found in CONUS Class I Hospitals, including nursing service staffing by wards. Brief position descriptions are provided for all hospital personnel except ward personnel. Nurse and attendant ward staffing yardsticks are assigned according to numbers of occupied beds for weekdays and weekends including standard leave allowances. It appears that staffing needs were based on the number of patients without giving consideration to patient needs or quality of care. The Army may find this method functional but one would question the quality of care provided the patients.

This guide was designed specifically for use in Army hospitals and would prove useful to them. It makes no contribution to nurse staffing research design, nor does it suggest an innovative or adequate assessement of nurse staffing needs. Very little space is devoted to nurse staffing. Since methods of assessment are lacking, this pamphlet is of little value to those interested in nurse staffing assessment.

C22. U.S. Department of Health, Education, and Welfare, *How to Study Nursing Activities in a Patient Unit*. Public Health Service Publication No. 370: Washington, D.C.: U.S. Government Printing Office, Revised 1964.

Review

Purpose.—This manual was written to help nursing services plan better staffing of inpatient units, use available nursing skills at their highest level, reduce operating costs, and improve care of patients. There are four areas of activities and a classification of activities by seven skill levels. The principle and and procedure for work sampling are presented.

Method.—The procedures involved in planning, implementing, and evaluating an activity study are explained. The selection of the study team and observer is presented. Forms for keeping records, making tabulations, and providing assessments are included. The appendixes are briefly described.

Activity Classification

There are 13 coded activities under the four areas of nursing activities: patient centered, personnel centered, unit centered, and other centered. Patient centered activities are defined as those activities that may occur in the patient's presence or away from him. Four subgroups of patient centered activities are giving care, other direct activities, exchange of information, and indirect care. An example of the type of description of these subgroups follows. Giving care are those activities occurring in the presence of the patient that involve the giving of care, including carrying out a nursing procedure, assisting doctors with treatments or procedures, and giving or assisting patients with personal hygiene.

Personnel centered activities are those activities that are primarily concerned with professional growth and development of nursing service personnel and with personnel management. Subgroups (areas with different codes) are professional development of staff, activities having to do with personnel management, professional nursing student program, and practical nursing student program. Unit centered activities are those activities that are concerned primarily with the patient's environment and the equipment and supplies for the unit. The coded activities for this group are environment, supplies and equipment, and other unit activities. Other centered activities are coded under personal and standby time.

The seven skill levels are administration, nursing, housekeeping, dietary, clerical, messenger, and unclassified. The seven major areas are coded and the activities included under these headings are presented. Each of these seven areas is defined and overt behaviors are given as examples. However, the subareas are not coded. Administration is described as those activities requring nursing judgment. The administrative activities involve responsibility for planning and providing effective patient care, for developing unit personnel, and for managing and operating the nursing unit. The administrative activities are subdivided into patient care activities, development of unit personnel, and unit management activities.

Work Sampling

This technique is based on the fact that the number of times an activity is observed being performed is closely correlated with the total time spent on its performance. The reader is referred to C. L. Brisby, "How You Can Put Work Sampling to Work," *Factory Management*, Vol. 110, No. 7 (July 1952), pp. 84–89, for explanation of this theory. The work of Faye Abdellah and Eugene Levine, "Work Sampling Applied to the Study of Nursing Personnel," *Nursing Research*, Vol. 3, No. 1 (June 1954), pp. 11–16, is mentioned as a source for why observations of nursing personnel every 15 minutes provide reliable data.

The selection and use of observers are described. It is suggested that observers be selected from the nursing staff to carry out observations on units other than their own. Other hospital personnel who are oriented to nursing, inactive nurses in the community, graduate nurse students, and hospital administration students have been used as observers. Adequate time for training is necessary. Familiarity with coding of activities and with personnel will add immeasurably to smooth performance. Labeling personnel with identifiable armbands will help.

The observer is to start each 15 minute period of observation at 15 minute intervals. The observation takes place at a different point on the unit and all personnel are observed each 15 minutes. Observers are scheduled for no more than 4 hours at a time. Experience has shown that an observer can observe between 10 and 12 people. The physical layout of the unit will influence the number of observers needed. Two full-time observers plus an additional one for emergency replacement are required for 80 hours of observation per unit—16 hours per day for 5 consecutive days.

Implementing the Study

A plan of operation for the study should be outlined in writing before the data collection. An advisory committee composed of representatives from the hospital departments and services, the medical staff, and the hospital board of trustees, should be appointed to advise and assist the study committee as needed, assist with informing personnel and patients about the study, review findings and plan for interpretation, and promote followup. The study committee, consisting of members from hospital administration and the nursing service department, should be appointed to determine scope of the study, define objectives, appoint a director, and a representative from any other involved department, and direct actual period of observation and data collection.

The job of study director requires full-time activity and includes instructing and supervising other members of the team, preparing materials and forms, collecting data, editing observers' records, preparing the study report, and analyzing and interpreting data. This person should be adept at working with groups and skilled in looking objectively at situations.

Other information regarding staff and equipment and facilities is presented. A clerk and typist will be needed. A room for the study project should be provided. To inform personnel is absolutely necessary. Examples of forms are included. A detailed procedure for tabulating data and preparing tables is given. The steps for preparing 12 tables for analysis are described. Suggestions for writing the report and assessing the outcome are also presented.

The appendixes include blank forms, worktables, and analytical tables. Illustrations of worktables are provided. Also given is the tool for dividing the total number of observations for each level and for each area for each personnel level by four (to obtain the number of hours spent at different skill levels and in the different areas). Sample analytical tables are given. Charts, observer's record, and instructions for machine tabulation are also included in the appendix.

Critique

This is a manual describing a method by which nursing activity in a patient unit can be studied. The use of the activity analysis will provide information about the kind of activity being engaged in by nursing personnel and the amount of time consumed in order to perform it, the level of nursing personnel engaged in specific tasks, and the amount of time spent with patients and away from patients.

The manual includes specific guidelines concerned with:

- goals of the study;
- initiation and planning for a study;
- personnel and equipment requirements for the study;
- direction and methodology of the study;
- collection, tabulation, and analysis of data; and
- reporting and assessing the outcomes.

The basic method of study employed is work sampling. A scheme is provided for the coding of nursing activities by areas, such as patient centered, personnel centered, unit centered, and other centered. Each of these are defined. Subgroups are also given for the activity areas. Examples are included to make the coding classification clear and readily understood.

Seven skill levels, reflecting the basic nature of the activity, are given. The seven skill levels are administration, nursing, clerical, dietary, housekeeping, messenger, and unclassified activities.

The manual provides a clear statement of principles of work sampling and specific directions for each phase of the study: (a) preparation of the study team, forms, and worksheets, (b) recording of data; (c) coding; (d) tabulating; (e) organizing materials for analysis; (f) conversion of observations into the man-hours spent in activities; and (g) presenting the results and assessing them.

The method provides a means of describing what exists. No assumptions are made about the quality or the nature of nursing practice. It provides a straight-forward description of what is going on so that the administrative staff can make decisions about the type of work in which nursing personnel engage.

This method, or an adaptation of it, has been used in many studies. The impact of this manual upon nursing services has been great.

C23. Veterans Administration, Department of Medicine and Surgery. "Methodology for Developing Staffing Criteria for Ward Administration." Special Study 10–3, Washington, D.C., 1968.

Review

Purpose.—This report concerns itself with the development and description of the methodology used in determining the number of man-hours required for clerical support in nursing units in the VA Hospitals that are medical and surgical in clinical character. It does not apply to the psychiatric hospitals.

Methodology and procedure.—The methodology is built upon the concept that the use of ward clerks is "to relieve nursing personnel of the necessity to perform administrative duties to the extent practical and feasible."

The report includes a statement of definitions, such as those pertaining to *time* (with particular reference to systems analysis, elements of procedures), task, allowance, work units, and flow charts. These definitions are necessary to understanding the report.

Agreement was reached between medical administration and nursing service as to appropriate duties for ward clerks. A short set of nonappropriate activities is also listed.

Flow charts were planned to assure that all essential tasks were accounted for in the procedures. The flow charts are based upon interviews of ward clerks and reflect "reasonably efficient procedures based on current practice." Standard time values were determined for each procedure using the building block approach. The standard time value represents "a synthesis of the leveled time value ('the average time adjusted to account for differences in skill, effort, conditions, and consistency between workmen and the factors surrounding an operation') for tasks comprising each procedure modified by the workload mix and frequency of occurrence." Data were obtained from two general hospitals for these calculations.

Allowance (compensation for productive time lost) was computed to be 16 percent. It was allowed for each procedure by multiplying the leveled time by a factor, 1.1905.

A work count of tasks and procedures was taken 7 consecutive days in 61 medical, surgical, and intermediate wards in 10 general hospitals. Self-recording devices were used with a system for auditing recording procedures included. The latter was a random sampling technique designed to minimize errors and to determine magnitude of error. The error. The error was reported as insignificant.

Findings.—From these data, three tables for criteria to be used in staffing determination for clerical positions were completed. The major variables reflected in the tables are • differences in hospitals, • differences in clinical bed sections, • intensity of patients (classifications), and • turnover rates. The three tables (each used in the calculation of clerical manpower requirements) contain numerical factors to be used with average daily patient load of the nursing unit. Table 1 concerns itself with individual patient related procedures; table 2, with miscellaneous procedures, nonpatient related; and table 3, tunover procedures.

The six sets of attachments explain the text. There is a list of ward clerk activities. A large section is devoted to the flow charts for ward administration procedures. The task titles and description of each (by code number) include starting and ending points and elements of the cycle. The leveled time in minutes is given for each task. Standard time is reported for 42 procedures and four subprocedures. An example of the worksheet, including instructions and the staffing criteria tables, concludes the report.

Critique

Over the years the proposition has been generally accepted that nurses spend too much time in clerical and minor administrative tasks. Because of concern over nurses' work encompassing these tasks, a study of methodology for making an estimate of amount of ward clerk staffing required for a nursing unit is related to the prediction of nurse staffing.

There is a need to develop a way of studying the work involved in routine tasks (repetitive in character) that may differ because of the volume of patients and the type of clinical mix. The methodology proposed is logical; however, it is predicated upon the belief that variation will be minimized. The report does not include the raw data upon which determinations are based or estimates made. It is, however, very comprehensive in the flow sheets prepared for each procedure.

This is a methodological study and, therefore, does not draw conclusions other than the reliability and validity of the methodology. There is no test of the methodology and its effectiveness when applied to a set of hospitals for which it is designed.

The research draws upon systems methodology; however, it does not go into a discussion of systems and their dependence upon one another. It does not draw upon the theory of systems.

The study draws upon two sets of variables: • the classes of tasks, number and amount of time required for each, and • the type of clinical service.

The value of the research resides also in its testimony of the application of systems methodology for the study of repetitive work. Furthermore, the proposed tables of staffing criteria and factors are innovative and suggestive for nurse staffing methodology.

C24. Veterans Administration, Department of Medicine and Surgery. "Classifications of Patients According to their Nursing Care Needs." Circular 10–64–170, Washington, D.C., July 27, 1964.

Review

Purpose.—The purpose of this circular is to extend the classification being used in the general medical and surgical and psychiatric hospitals to nursing home bed units and to continue the system.

Method.—The instruction guide places patients into one of four categories ranging from Category I, intensive care, to Category IV, minimal care. It is "to serve as a measure for staffing determination."

The guide includes a specific procedure for classifying and selecting the categories and a set of criteria for each category. Many examples are given to assist in the use of the criteria. The examples are given for medical, spinal cord injury, surgical, and psychiatric patients.

Critique

The basic approach outlined in this guide is similar to that of Connor. However, no reference to the source of the classification system is given.

The assumptions are made that (a) professional nurses in the head nurse position can distinguish the nursing care requirements of patients; (b) the varying levels of care requirements necessitated differences in staffing; and (c) there are criteria that are applicable to all patients, regardless of clinical placement.

Criteria are given for classification of patients into four classes along a continuum from intensive to minimal.

The procedure is as follows:

(a) Drawing upon her knowledge of the patient, the head nurse or her designee classifies the patient.
(b) The primary clinical service on which the patient is found serves as a guide for patients with multiple diagnoses.
(c) Applying the criteria and using the examples, the head nurse places a labeled flag on the kardex of each patient, and then reports the information on a form provided.

This guide is very specific with clear directions for the classification procedure. Several examples are given that assist in operationally defining the categories of patients. The guide specifies who will classify the patient and provides tools for use in the kardex.

Although the guide states that the results are to be used in staffing determination, the guide contains no proposal as to how the data obtained in the classification system will be used to make that determination. Neither does it include a statement of rationale upon which the issuance of the guide is based. These oversights limit the value of the guide.

C25. Veterans Administration, Department of Medicine and Surgery. *Program Guide, Nursing Service: A Guide for Studying the Utilization of Nursing Service Personnel in Veterans Administration Hospitals.* G-7, M-2, Part V, Washington, D.C., March 30, 1961.

Review

This methodological guide grew out of major research efforts carried on at the VA Hospital, Bronx, New York, under the leadership and direction of Marguerite Kakosh and Frances Reiter. The Institute of Research and Service in Nursing Education also served in the study. Its personnel, in particular Helen Bunge and Irving Lorge, served as consultants.

Purpose.—The guide has as its purpose the provision of a method of studying nursing practice that "yields composite information on 'who does what' in nursing care of patients and when and where they are done." It is restricted to the study of the activities of head nurses, staff nurses, practical nurses, and nursing assistants.

Method.—The approach makes use of the work diary method of study, the classification of data into eight categories and 72 subcategories, the determination of time spent in these categories, and the use of jury to judge appropriateness of activity performance by nursing personnel.

The program guide provides direction on all aspects. Examples of forms, of coding, of tabulating, of construction of jury lists, or jury response sheets, and the like are given. Tests for checking coding reliability are included. Ways of reporting and implementing the study are proposed. A glossary of terms and a full listing of the code for activity analysis are reproduced in the appendix.

Critique

The basic approach outlined in this guide is derived from work diary analysis, categorizing nursing functions into large groupings, and the use of jury ratings. It draws heavily upon the research conducted by Kakosh and Reiter.

The basic assumptions are these: • at 5-minute intervals, individuals can accurately and descriptively report tasks performed; • nursing practice consists of a series of tasks that can be identified and assigned by professional nurses to the appropriate level of worker; and • nonnursing tasks are likewise identifiable, and individuals with expertise in supporting fields and in management can categorize these into supporting service, appropriate to the task.

The factors used in studying the utilization of nursing personnel include:

- classes of tasks and their subtasks,
- time requirement for each class and subclass,
- level of worker who performs the task.

The general steps in the use of this method of studying utilization are well described. They consist of:

(a) planning the study: its purpose, objectives, design, direction, preparing personnel, time plan, and test run;

(b) collecting and classifying the data; testing for coder reliability;

(c) tabulating and analyzing the data, including preparation of tables and their interpretation;

(d) classification of activity as to its appropriateness, inapproriateness, or its questionable nature, including jury selection and instruction; and

(e) implementation of the findings.

Samples of both tools and calculations are included. The instruments (tools) are varied and from the examples readily reproducible. The list of tools is as follows:

- activity sheet for day tour of duty,
- tabulation sheet for recording data that has been coded,
- form for tables,
- activity list format for jury response,
- Jury I and II response sheets, and
- tabulation form for analysis of jury response.

The guide is simply written and gives examples of forms, tables, calculations, etc., that can be readily reproduced. The author anticipated problems that might be encountered and included directions for resolving them.

The guide has been widely used in V A hospitals and in other institutions. Therefore, its feasibility has already been tested. However, whether or not the methodology provides more consistent and reliable data than other approaches can be argued. The volume of work entailed and the time required for application of the methodology are also items of concern.

C26. Wandelt, Mabel A., and Ager, Joel. *Quality Patient Care Scale.* Wayne State University, Detroit, Michigan, 1970.

Review

Purpose.—The purpose served by the *Quality Patient Care Scale* (Qual Pa CS) is to provide an objective measure of nursing care received by patients.

Instrument.—The Qual Pa CS, which is the main body of this report, is 68 items in length and is modeled after the Slater Nursing Competencies Rating Scale. The Qual Pa CS allows for an observer to rate directly, indirectly, or retrospectively, any nurse-patient interaction or nursing intervention for a particular patient, in a given period of time, on a 1 to 5 point scale. The rating categories are: (1) poorest care, (2) between, (3) average care,

(4) between, and (5) best care. Spaces are provided so that rating "not applicable" or "not observed" may also be indicated. The scale provides for ratings to be made in the following six areas of interaction and/or intervention: (1) psychosocial, individual; (2) psychosocial, group; (3) physical, (4) general, (5) communications, and (6) professional implications.

Method.—To assist the observer a cue sheet is provided that lists from 3 to 6 behaviors for each item on the scale. The authors note that the cues are arbitrarily selected examples of actions illustrative of behavior categories identified by an item. One cue may serve to demonstrate the quality of nurse actions identified by several items. The cue sheet is the tool designed by the author to contribute objectivity to measurement of nursing interactions or interventions on behalf of patients.

A detailed guide for use of the scale is included. Instructions are provided for the individuals who will be doing measurements of nursing care, for the observer-raters, and for those who will be using the measurements of quality and the evaluations of nursing care. The calculation procedure is clearly outlined and an example of the calculations given.

The authors provide a list of definitions of terms used in the report and also include samples of additional material helpful when Qual Ra CS measurements are being taken. These forms include an Information Fact Sheet, a Rater's Notes Assessment and Planning Care form, a Fact Sheet about Qual Pa CS, and a table of random numbers.

A description of how the scale was developed is not included in this report. The authors state that the scale has been demonstrated to possess the many desirable attributes of an instrument in which confidence is placed, including high interrater agreement. When used as outlined it is, according to the authors, a reliable measuring instrument and when 30 or more items are rated will yield a valid score. The authors also submit that a valid and reliable measurement of nursing care quality for a particular unit can be secured by deriving a mean score from the scores determined for as few as 5 or 15 percent of the patients, randomly selected from among all patients on that unit on a particular day.

Critique

One of the most perplexing problems associated with nurse staffing is the evaluation of the services or care provided patients by the staff assigned to a group of patients. Numbers of individuals alone are not the answer to staffing. An estimate of the effect of the product they produce is an essential component of a staffing program.

These authors propose a scale that can be used to rate interaction or intervention between the nurse and the patient. Its stated purpose is "the evaluation of the quality of nursing care received by patients" (p. 1 Guidelines). The materials are clear. The manual is well developed in that cues are provided as to meaning of statements in the scale. Definitions are given, and procedure is highly developed.

The selection of items is not explained, neither is the construction of the scale itself. Individuals can challenge the inclusion of some items that appear to be highly value laden as to whether or not the presence or absence of the behavior exhibited in the statement really reflects quality. Furthermore, they will ask whether what is observed has a bearing on the patient's getting well or maintaining himself. Some of the items reflect untested assumptions about what nurses do for patients. Furthermore, how the observer obtains prior sufficient data, as well as present data, to make a judgment that is based on anything but her impressions, remains unanswered. Many items are global and reflect the usual myths about nursing practice. The effect of the quality measured on patient recovery remains elusive. The interpretation of what the results of the scale really mean is missing.

D. Periodical Literature

D1. **Abdellah, Faye G., and Levine, Eugene. "Developing a Measure of Patient and Personnel Satisfaction with Nursing Care."** ***Nursing Research*, Vol. 5, No. 3 (February 1957), 100–108.**

Review

Purpose.—To develop an instrument to measure satisfaction of patients and personnel with nursing care and to determine what variables affect the amount of satisfaction measured by this instrument.

The basic question is what determines how patients and personnel react to the nursing care provided. The average patient receives 4.8 total nursing hours in contrast to 3.3 nursing hours received 10 years before this study. Yet many hospitals continue to report vast shortages.

Approaches to this problem include form letters given to the patient upon discharge, a questionnaire developed by the AHA, and a hospital survey conducted by the British Ministry of Information.

For this study, the criteria for a valid and reliable measure of satisfaction with nursing care were:

- measures satisfaction from patients' and personnel's points of view,
- provides data that can be quantified and statistically applicable,
- provides a sensitive and reliable measure,
- reports events in a way that accuracy can be validated,
- stimulates frank answers,
- does not rely totally on the memory of the respondent,
- provides specific information that can form the basis for constructive action,
- can be administered easily to a large group of respondents.

The development of this instrument took 2 years. Four major revisions were undertaken in an attempt to meet the established criteria.

Methodology.—The investigation was initiated between the Division of Nursing, USPHS, and the Cleveland Commission on Nursing. A nurse, psychologist and statistician team spent 1 week in each of three hospitals in the Cleveland area. One hundred patients and all nursing and medical personnel were given forms. Instructions on patients' forms were "List events of care you have received that were either satisfactory or unsatisfactory." Personnel's forms were entitled "Instances in which patient care might have been improved." Forty patients in each hospital were interviewed in addition to filling out forms so as to check the accuracy of the forms. Analysis of data consisted of grouping the events according to content and totaling the number of times each was reported. The result of this exploration showed that group interviewing worked better with personnel than with patients. Patients were more communicative when interviewer wore a nurse's uniform rather than a laboratory coat. Better rapport with personnel was created when interviews were held off the unit. Analysis also showed that when a greater number of unfavorable events were reported, less satisfaction with nursing service was verbalized in the interviews. Cross checking of forms filled out by patients and personnel assured accuracy of reported events.

The forms used in the beginning investigation were primarily used to develop a simple, completely directive, and unambiguous instrument. One hundred events were selected on the basis of frequency to be included in a checklist for patients and a similar checklist for personnel. Checklists were given to all personnel in the same three hospitals in Cleveland. Participants were to check frequency of occurrence of events through use of a four-point scale. A sample of patients and personnel was selected to rate each event on the checklist according to its importance to patient satisfaction. A five-point scale ranging from "not important" to "very important" was used. Results showed that the most disturbing events had to do with drinking water, food, and environmental noises. Examples of least important and most important sources of satisfaction are presented.

Nursing hours per patient day were compared in 20 Cleveland hospitals. The hospital that had the most favorable score on the checklist was providing the smallest number of total nursing hours per patient per day. Professional nursing hours in this hospital were much higher than in the other two hospitals. From the patients' viewpoint, three things contributed to nursing dissatisfaction: insufficient time to explain the treatment, insufficient thought to patient and family needs, and insufficient time with patient. From the personnel's point of view, four factors contributed to the feeling of nursing shortage: excessive patient noises, interference from visitors, incomplete records, and insufficient attention to patient needs.

The revised instrument, used in a research hospital in Maryland, was reduced to 50 items that occurred most frequently or that rated highest in importance. The instrument given to patients on four units and to personnel, for one day, was broadened so that frequency scores would include past events. Events relating to medical staff and other departments were deleted. Interviews were held with a sample of participants to assure understanding of the checklist and to assure accuracy of the reported events.

The scale was changed to indicate events of the past week only, and ambiguous words were simplified. This form was used in two other Baltimore hospitals. Forty patients and 57 personnel members participated. The scoring problem was approached by use of the Q-sort, to assess the value or importance of one item in relation to others. The method of sorting 47 events into five categories ranging from "very most important" to "very least important" is described in detail. A final score could vary from 0 to 150.

The final instrument was administered in 60, 100- to 500-bed, non-Federal hospitals in seven States. Hospitals were stratified according to ownership, location, and size. Ten hospitals were replaced because of refusal to participate.

The study director in each hospital was a nurse employed full time by the hospital. Training conferences were held in three areas. Two field consultants, who participated in the validation studies, visited each hospital before and after the study.

Patients and personnel in 60 hospitals responded to checklists. Space was provided for comments by the respondent. Checklists from 8,000 patients and 12,000 personnel were tabulated. The scores were based on the sum of weights for events. Data from individual hospitals were used to show the portion of respondents reporting the occurrence of each of the 50 events. The average score of seven categories of events for patients and nine categories of events for personnel was also given. Each hospital also received average scores from other hospitals.

The relationship between patient and personnel satisfaction with hours of care, hours of professional care, size of hospital, and ownership of hospital was tested by the use of the general linear hypothesis theory. Values of "betas" are estimated through the use of the method of least square. Amount of satisfaction is determined by analysis of variance.

Findings.—The amount of total nursing hours provided per patient each day does not affect the amount of patient satisfaction with nursing care.

The amount of professional nursing care provided does have a strong positive influence on satisfaction.

Older patients and personnel are generally more satisfied with patient care than are younger ones.

Implications.—The events contributing to feeling of nursing shortage can provide clues for providing a more satisfying atmosphere.

The patient and nurse want more professional nursing time.

Total nursing hours have little relationship with level of patient satisfaction.

Basic information relating to patient and personnel satisfaction is provided.

An instrument is available for hospitals to compare the level of satisfaction with other hospitals.

Critique

This article describes in detail the development of the instruments used in the study, *Effect of Nurse Staffing On Satisfactions with Nursing Care.* Throughout the 2 years required for its construction, the authors gave keen thought to its purpose and attention to technical details and tested it with great care. The article vividly describes each phase of the methodological process from which the instrument gradually evolves. In this respect, the article serves as a model for tool construction.

The value of the article also resides in the statement of criteria set up for an adequate measure of satisfaction. In their work, other investigators can easily draw upon these criteria, since they present qualities that in many respects are universal.

D2. Abdellah, Faye G., and Levine, Eugene. "Polling Patients and Personnel—Parts I, II, III, and IV." *Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 31, Nos. 21, 22, 23, and 24 (November 1, 16 and December 1, 16, 1957), 44–48, 61–64, 53–57, and 43–44.

Review

"Polling Patients and Personnel" is a four-part series of articles based on the results of a study conducted by the USPHS and the AHA. The articles are subtitled: "What Patients Say About Their Nursing Care," "What Factors Affect Patients' Opinions of Their Nursing Care," "What Personnel Say About Nursing Care," and "What Hospitals Have Done to Improve Patient Care." Nearly 9,000 patients in 60 general hospitals reported omissions in nursing care.

Part I presents patients' opinions of their nursing care. Page 2 of a four page checklist for patients is included in this report. Almost all the events refer to needs that nurses could fulfill. Each checklist was scored for number of unfulfilled needs and for level of importance. One-third of the patients reported no omissions in care and only one in a hundred patients reported a large number of occurrences. The least frequently reported items fell mainly in areas of personal hygiene and supportive care. The most frequently reported omissions were in the area of rest and relaxation and included too much noise and poor air in the room. The average percent of patients reporting an occurrence of each event is presented in a table. Events are grouped into seven main categories: events indicating satisfaction with care, rest and relaxation, dietary needs, elimination, personal hygiene and supportive care, reaction to therapy, and contact with nurses.

Part II discusses factors affecting patients' opinions of their nursing care. Omissions in nursing care are analyzed according to age, sex, marital status, and type of room accommodation. Younger patients consistently reported more unfulfilled needs. Males seemed more satisfied than females and married patients indicated fewer omissions than single patients. The effect of different room accommodations upon the patients' satisfaction could not be determined. Tables represent: age, sex, and marital status of 8,660 patients; percent of patients reporting no occurrences of omissions in nursing care, by age and marital status; and average category scores for patients, by size of hospital.

Part III discusses what hospital personnel think of patient care. This report is based upon 9,480 participants: 155 hospital administrators, 2,083 doctors, 1,147 supervisors and head nurses, 1,681 professional staff nurses, 1,380 professional nursing students, 1,053 practical nurses, and 1,981 nursing aides and orderlies. The average scores of participants ranged from 27.2 (doctor's) to 48.2 (nursing administration). Highest satisfaction is a score of zero, which ranges to 150 indicating lowest possible satisfaction. A table represents the average percent of personnel reporting occurrence of each event by type of personnel. Though some unfulfilled needs were reported by all personnel, each category of personnel had its own concerns. Administrators were concerned about staffing; part-time help presented many problems. Key problems were nurses' lack of information about the patient, doctors not communicating patients' needs to nurses, and visitors interfering with treatments. Doctors said that nurses have too little time to spend with the patients. Nurses said that bookwork, poor utilization of personnel, and lack of clarification of duties keep the nurses away from the patients. Practical nurses and aides said they wanted more information, pay, and training since they do the nursing.

Part IV reports specific programs for improving patient care. The administrator of each of the 60 hospitals was sent the findings for that particular hospital. There was no agreement as to the extent to which the content should be made available in each hospital. Recommendations for action ranged from inservice training programs to elaborate proposals involving construction. Areas of concern were noise, nurse-patient relationship, dietary, and housekeeping.

Critique

These four articles contain the results of the study, *Effect of Nurse Staffing on Satisfactions With Nursing Care*, which has been condensed for release in a periodical. The research study is critiqued under the title of the basic research.

D3. American Hospital Association. "Patients Over Sixty-Five Receive More Nursing Care, Early Results by AHA Study Indicate." *Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 41, No. 4 (February 16, 1967), 23a–23b.

Review

The purpose of the study described in this article was (a) to test study methodology including the training of a research staff, the feasibility of the forms, and the capability to accomplish a nationwide research project on a decentralized basis; and (b) to determine whether there is a difference in the amount of basic nursing care received by patients 65 years of age or older as compared with the basic nursing care received by those under 65 in medical or surgical units in a group of selected hospitals. Methodology included application of work sampling techniques by registered nurse, licensed practical nurse, and student nurse observers who were trained by the research staff. Fifty-five hospitals over the Nation comprised the sample and included 3,000 to 5,000 work sampling observations per hospital. Observers recorded the classification of staff members, the activity being performed, and data about the patient involved in the activity. Summary data (39 out of 55 hospitals) showed that patients over 65 years of age received 55 minutes more nursing care per day than those patients under 65 years. Variability was found between hospitals. In five of the 39 hospitals, patients under 65 years required more nursing care time per day. The findings do not distinguish between the class of nursing personnel rendering the nursing care—an important variable in cost assessment.

Critique

This article presents, in general statements, the findings of the study "AHA Activity Study Project Report," conducted by Jacobs, S. E.; Patchin, Naomi; and Anderson, Glen. The study is annotated and critiqued under that title.

D4. Bartscht, Karl G. "An Analytical Approach to Nursing Scheduling." *Hospital Topics*, Vol. 41, No. 9 (September 1963), 44–45.

Review

Purpose.—To consider the problem of what time to schedule personnel.

Sample.—The administrator, nursing director, and assistant nursing director of Emma L. Bixby Hospital in Adrian, Michigan worked with Karl G. Bartscht, an industrial engineer.

Instruments and procedure.—Evaluation of schedules showed that schedules were done weekly at the nursing office. A master staffing pattern was established for low, medium, or high census but there was no variation for individual units.

A work sampling study was done on selected areas of varying census levels. Nursing supervisors made the observations and assisted in the recommendations. The work sampling project was used to evaluate the activities of nursing personnel, the required nursing needs by classification of personnel, and the activities by hour intervals to determine "peak" and "valley" requirements. Details of the work sampling procedure are not included in this article.

Results.—The majority of personnel were performing few duties that could be done by lower classified personnel. Since a large percentage of paperwork was completed on the night shift, work simplification techniques helped to further reduce paperwork. Fifty percent of the nonproductive time occurred between midnight and 6 a.m.

The night shift overstaffing was adjusted and one day shift aide per nursing station reported 1 hour earlier. One licensed practical nurse per floor was scheduled to come in an hour earlier. Two floors were continually filled to capacity, allowing the third floor to vary considerably. A "float" staff of a varying number of licensed practical nurses and aides for each shift reported to the supervisor at the beginning of the shift. During normal operations, the personnel are assigned to the same floors they would have worked prior to the incorporation of the float staff.

A 6-week cyclical schedule replaced weekly scheduling. All employees followed the same schedule. Full-time personnel replaced part-time employees whenever possible.

Critique

This article presents a vignette of the experience of one hospital's nursing service in solving its problems of scheduling. The steps taken are clearly identified. However, the article does not describe in any detail the implementation of the study, the methodology, or how the analysis was done. The idea of controlling assignment of patients to two nursing units to stabilize patient population was one feature of the solution. This step has not been suggested in other staffing studies.

The emphasis on relating work shifts of certain employees to workload rather than to the strict 8 hours, three shifts a day, schedule is commendable. The kind of work and the level of personnel to perform the tasks must be identified.

D5. Blumberg, Mark S. "'DPF Concept' Helps Predict Bed Needs." *Modern Hospital*, Vol. 97, No. 6 (December 1961), 75–82.

Review

Distinctive patient facilities (DPF) consist of one or many nursing units in a given hospital. A facility is distinctive if used by only one corresponding distinctive type of patient under normal circumstances. The male, surgical, charity ward is an example.

Devising a regional hospital plan should be determined by the anticipated average load on a distinctive patient facility for any given population in the future rather than the total number of beds available.

Population trends and unessential services must be considered. The consequences of too few or too many beds are described. Admission of patients may be delayed, a facility may be substituted in lieu of the proper one, and a patient may be prematurely discharged. The largest cost of empty beds is the idle staff. The workload of employees working on distinctive patient facilities, assigned to nursing units, and in supporting services fluctuates as the patient facility fluctuates. The workload of those employees working elsewhere in the hospital, such as kitchen, X-ray, laboratory, pharmacy, laundry, medical records, central supply, and administration, depends on the workload in the whole hospital.

A procedure is proposed that clarifies factors relating to bed needs and will permit meaningful comparisons between various hospitals and communities. The number of beds is considered adequate when the distinctive facility is fully occupied for a specified proportion of time. The problem is determining what chance of overloading in a given service can be tolerated. The number of days during a set period of time during which a given load was exceeded is a peak load. The frequency distribution of peak loads on various distinctive services approximates log-normal distribution. Unpublished studies indicate that daily (midnight) census figures on a DPF is generally Poisson-distributed. This property of predicting, when only the average is known, permits estimation of the proportion of times that a given caseload will occur when only the DPF is known.

Theoretical circumstances that govern whether or not the daily caseload is Poisson-distributed are mentioned. The daily census may be expected to be Poisson-distributed when the occurrence of the condition requiring hospitalization is random and only a small proportion of the eligible population falls sicks at one time (such as obstetrics). Admissions cannot be random if a distinctive patient facility is often filled to capacity, if the reason for hospitalization is epidemic or seasonal, or if there is rapid growth of average census. Services with a longer average stay as in psychiatry should have a Poisson-distributed daily census.

To the extent that daily caseloads are Poisson-distributed, numerical estimates can be obtained. The bed complement required for a given average census to have the distinctive patient facility be fully occupied, either 1 day in 100 or 1 day in 1,000, can be determined.

There are eight examples of how to use the table included in this article that will determine bed needs.

Critique

One of the major problems in staffing nursing units relates to the variability of workload for the nursing personnel. The resolution of the problem of amount and kind of staff has been approached through the concept of flexible staffing patterns. However, Blumberg proposes in this article an approach to the prediction of workload, based upon distinctive features of the patient population and an analysis of unpublished studies concerned with midnight census variations. His argument makes sense. The guidelines and examples given are clearly stated, sufficient in number to help the reader test his comprehension of the idea, and readily reproducible.

In the use of any staffing methodology, Blumberg's proposal about census variations will make a contribution. It is true that census alone will not control workload. But by building in other parameters, one may be able to reduce the variability or explain why standby nursing time of highly paid professionals occurs.

D6. Blumberg, Mark S., and Drew, Jacqueline A. "Methods for Assessing Nursing Care Quality." ***Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 37, No. 21 (November 1, 1963), 72–80.**

Review

A variety of methods hospitals may use to determine the quality of care are discussed in this article. The reasons for determining a measure of quality of nursing care are that the nursing profession is concerned with self-examination of its practitioners, the hospital as a public institution can feasibly be reviewed, and consensus in preferred nursing procedures should be attainable. A useful view of the nature and variety of patient care might be obtained by reviewing a variety of procedures to assess quality of care.

The checklist for self-appraisal of nursing service is described by V. C. Bredenberg, "Nursing Service Management, a Checklist for Self-Appraisal," *Hospital Progress* 40:410, February 1959, is a comprehensive description of possible procedures. Studies done on the number of nursing hours spent in various activities do not give direct information about quality. (Finer, H., *Administration and the Nursing Service*, New York: the Macmillan Co., 1957, pp. 116–131).

The means for surveillance of hospital nursing may enlist people who are sources of information on patient care. A report by R. E. Trussel, *The Quantity, Quality, and Costs of Medical and Hospital Care Secured by a Sample of Teamsters Families in the New York Area*, New York: Columbia University, 1962, indicates that patients are correct when they believe their hospital care is below standard. Some hospitals provide forms for patients to complain about their hospital care if they wish to. Faye G. Abdellah in "Let the Patients Tell Us Where We Fail," *Modern Hospital*, 85:71, August 1955, emphasizes the necessity of systematic and periodic inquiries since patients may forget differences in quality of care when they are to be discharged from the hospital. Sociologists and psychiatrists have developed techniques to elicit information without destroying patients' faith in hospital care and without peer judgment as to the value of the topic. Patients should merely be asked to report what happened to them. This report should be judged by an independent professional source as to whether it represents good or bad quality of care. Visitors and their comments should be considered secondary sources of information for they trace back to the primary witnesses, the patients. Physician complaints should be kept in a floor log to indicate problem patterns over a period of time. The most obvious source of information is from the nurses themselves, but this is also the least objective. K. N. Barker and W. F. McConnel, "How to Detect Errors in Giving Medications," *Modern Hospital*, 99:95, July 1962, reported little success with an anonymous reporting system for medication errors. The objective of any successful reporting systems must protect the reporter and the reported.

Premises underlying present reporting systems assume that superiors should be responsible for the quality of care provided by subordinates but do not provide an opportunity for subordinates to note and report deficiencies. Special personnel who are not nurses or physicians may be hired to develop information regarding the quality of care. F. S. Groner in "Hospital Hostesses: They Radiated Good Will and Helpful Service," *Hospitals, J.A.H.A.*, 34:47, August 16, 1960, writes of employees who are college graduates trained in the behavioral sciences who are responsible for finding problem areas. Government agencies and voluntary agencies such as the Joint Commission on Accreditation of Hospitals require inspections of some facilities in order to license them, which implies some review of the quality of care provided. A separate agency where major interest is assisting hospitals in maintaining their quality of patient care is desirable.

The persons who are potential sources of information relative to the quality of care may supply information through a variety of techniques. A research comparison of alternate techniques would be useful. Trained professional personnel may detect gross nursing deficiencies by direct inspection of the patient and his immediate environment. Minimal cooperation by patients and personnel is required but substantial training and time on the part of the observer is necessary. R. V. Johnston in *Personnel Program Guide for Nursing Education and Nursing Service Agencies*, Philadelphia: W. B. Saunders, 1958, pp. 84–91, and J. Barrett in *The Head Nurse*, New York: Appleton-Century-Crofts, 1962, pp. 241–249, show that nursing rounds can provide an opportunity for such inspection. The spot checks are more valuable than regularly scheduled inspections in evaluating the whole gamut of nursing functions. Specialized procedures for inspection of personnel can be adopted as described in J. J. Semar, S. F. Yoffer, and L. Glude, "Effective Control of Staphylococci in a Nursery," *New England Journal of Medicine*, 265:1171, December 14, 1961, which describes periodic culture of nursing personnel hands. Some nursing administrative texts stress the role of the nursing supervisor or head nurse as directly responsible for inspection of personnel and their functions to determine overall performance.

Hospitals must insure the proficiency of their own nurses by using practical tests of their on-the-job efficiency. Examples include actual demonstrations of isolation techniques and the examination of 100 transcribed doctors' orders. Practical tests should be given to nurses when they change their responsibilities, their positions, or their departments. Personal interviews of all previously mentioned classes of persons are potential sources of information regarding patient care. Special reports that point out deficiencies in nursing care can be used. The reports filled out after a known error has been committed include only the reports of conscious errors, and these are not reported unless the individual committing the error is motivated to fill out the report. This report should prompt investigation so that appropriate remedial action can be taken. The proficiency reports on nurses are to evaluate an individual's performance rather than techniques. As such, they are of little value in determining deficiencies in nursing care.

Two types of reports that can be used at regular intervals are checklists and open-ended questionnaires. Review of patient records can be valuable and is described in Pearl R. Fisher, "The Nursing Audit," *Nursing Outlook*, October 1957. M. Dudley, "These Nurses Check Up On Each Other—And Like It," *RN*, 24:38, January 1961, shows emphasis on style and completeness of notes rather than on style and completeness of the procedures and techniques described in the notes. More attention should be given to what physicians have ordered and what has been recorded. Staffing records can show staffing complements on a nursing unit that indicate managerial inefficiencies.

The development, use, and evaluation of these techniques are a responsibility of all those associated with hospitals, and a special responsibility to those in nursing. Self-regulation is one of the most difficult and important responsibilities of any profession.

Critique

This article reflects the authors' ideas and beliefs about the need for an information system within a hospital that will provide a continuing flow of data by means of which nursing professionals can make judgments about the quality of nursing practice provided to patients.

The article is well written and contains many useful suggestions. There are references to a few studies that have attempted to make use of suggested techniques. It draws upon the research report of Drew and is reviewed and critiqued elsewhere in this section.

D7. Bosworth, Patricia. "Project Report of Unit Management." ***Texas Hospitals*** **(August 1966), 20–24, and 35. (Xeroxed).**

Review

Location.—A nursing unit geographically located on one floor that provided a private area, a staff area, and a specialized area (not explained). The unit was well organized and the medical and nursing staff requested that the pilot study be conducted there.

Purpose.—To test a proposed plan of using unit managers and unit clerks to enable the head nurse to spend more time in nursing functions emphasizing direct patient care.

Methodology.—"A series of conferences with the director of nursing services and the nursing council members established what the nursing leaders identified as nonnursing functions, and they envisioned how these responsibilities may be delegated. These observations were obtained by the random sampling technique. For example, eight 90-minute observations of the minute-by-minute activities of head nurses and unit clerks were made spanning a 6-week period during the 7 a.m. to 3 p.m. tour of duty. Information was reviewed and abstracted from the observations for job descriptions and lines of responsibility.

"Conferences were held with the director of all the hospital services, and jointly a compilation was made of the objectives and functions of each service that would be pertinent to Unit Management. These were compiled in book form for use in the training program.

"Procedures specifying nonnursing administrative duties that could be performed by the unit clerk were endorsed by the Practice and Procedure Committee of the Nursing Service Department.

Selection of criteria for candidates within the unit management system is explained. The method of training is referred to.

The nurses expressed interest in delegating nonnursing functions. "We met weekly and sometimes daily, individually and in groups. Discussions indicated a desire for self-understanding." The California Personality Inventory was administered and individual Head Nurse Profiles were constructed from the observations recorded.

"A plan of action was followed in orienting the head nurses in unit clerk and unit manager responsibilities." The pilot study was planned for a 6-week period during which time post-observational data were collected of head nurses' and unit clerks' activities for comparison with the pre-observational data.

"Weekly rounds of the area were made by the area hospital administrator, nursing and medical representation, project director, instructors, and unit managers. The unit managers made weekly rounds with the head nurses and physicians of the units. Weekly evaluations of the trainees were made by the trainees themselves, unit managers, and instructors." A daily log was kept by unit clerk and unit managers.

"The assistant nursing director, area hospital administrator, and medical representative evaluated unit management around the clock. These evaluations and opinions recommended implementation of the program." Some evaluations included impressionistic evaluations of the medical staff, the nursing staff, and the area administrator, and the reactions of the unit clerks themselves were important. "The statistical analysis of the amount of time spent on essential nursing duties before and after the training program is perhaps the only really unbiased judgment we have." "The mean time for each nursing behavioral element was determined from the nursing data. . . ."

"Pre- and post-observations collected randomly on the unit clerks indicate a significant change within the area of inter-intra communications." (Presumably this refers to interdepartmental communication.)

Educational tours of the hospital service areas and lectures presented by members of the hospital services representatives, familiarity of chart data acquired through supervised practice of procedures presented in classroom instruction, and return demonstrations observed on the units were mentioned as part of training of unit clerks.

Findings.—"Four weeks is recognized as the critical time for the professional head nurse's manifestation of trust in the system. Following this interval the head nurse was observed to be spending less and less time in the patient care station and more and more time in the patients' immediate environment."

Based on random sampling observation studies, management tasks used to take 25.6 percent of nurse's time. Postdata indicate this percentage decreased to 4.3 percent. In therapy-centered activities there was an increase from 15.6 percent in predata to 43.6 percent in post data. Total time spent by nurses on each of the seven major nursing activities (not mentioned) categorized shows an increase from 64.4 percent to 96 percent in patient centered tasks during the unit management experiment.

Findings indicate that the head nurses are spending two to three times the amount of time in nursing activity with direct patient contact. Original data indicates 2.2 to 3.5 minutes per nursing activity whereas postdata indicates 4.8 to 7.5 minutes of the head nurse's time being spent with the same patient nurse activity.

The clerks expressed confidence, established through the educational tours to the hospital service areas and the lectures presented by members of the hospital service representatives, plus familiarity of chart data.

Referring to the California Personality Inventory: "The test further reveals that the group is mature, forceful, dominant, demanding and foresighted, independent and self-reliant, and as having superior intellectual ability and judgment." "This empirical evidence . . . helps provide explanation for the interest manifested by them to the project director. . . ."

Conclusion.—"The success of the Pilot Study in one area serves as a stimulus for plans to expand the Unit Management Systems to other areas of the hospitals."

Critique

The introduction of the unit manager and unit clerk has been made into many hospital organizations without any attempt to ascertain their impact upon nursing activity. This periodical article reports the introduction of these two positions and an examination of the resultant changes in the functions of the head nurse. This question is timely and highly important.

Since the article has been written for a periodical, much of the background data and their treatment are missing. One cannot state the scientific merit of the report. Costs of the full length program are too high to justify purchase for review. However, the author has served as a consultant to hospitals and to State hospital associations so one can probably assume that some impact has been made upon the hospital nursing field.

D8. Christman, Luther P., and Jelinek, Richard C. "Old Patterns Waste Half the Nursing Hours." ***Modern Hospital*****, Vol. 108, No. 1 (January 1967), 78–81.**

Review

By completely reorganizing and restructuring nursing service around a completely new model, three to four times the current professional nurse manpower now in force can be recovered.

The nursing profession attempted to solve increasing demands by employing large numbers of lesser trained personnel. They never fully realized that the quality of nursing care can be no greater than the training of the person giving direct care. This care through others led to the functional method of care resulting in emotional evaluation of undesirable tasks. More attractive salaries became attached to role positions, not to competence with patients. Over specialization in tasks resulted in a desire to limit one's activities and in a lack of responsibility for follow through. Work measurement studies show that only 25 to 50 percent of the skills of registered nurses are used daily.

A model is proposed to disband traditional concepts and prepare a framework for investigation dealing with the broader components of the system. The terms "clinical" and "nonclinical" will be used to designate which activity belongs to nursing. A clinical activity is any action that is intended to assist in preventing, reversing, or arresting a pathological state of the patient. The nonclinical tasks can be properly assigned to a service unit supervisor who is responsible to the director of service units, not the director of nursing.

By using service supervisors, hospital administrators will have a direct extension into first-level management. To permit coordination, the roles of service supervisors and registered nurses must be constructed to be mutually supplementary and complementary. The service supervisor should have at least a baccalaureate degree. His experience as service supervisor could be a foundation for a career leading to hospital administration. All low level tasks necessary to manage and comfort patients should be assigned to utility aides. This group of workers would be under the supervision of the service supervisor.

The work flow could begin by assigning the same registered nurse and the same utility aide to the same patient every day. This would promote concentration on continuous process of care rather than on the same series of tasks. Nurses with advanced training in the clinical specialties are uniquely qualified to take on clinical roles. Consultation with nurses about problems of nursing practice may have the same effect on upgrading nursing practice that medical specialties have on medical practice. The lack of adequate economic stimulus is partially responsible for the lack of stability and satisfaction of the nursing staff.

The model suggested in this article is hypothetical and has never been tested empirically.

Critique

This is a general article that only indirectly touches upon staffing methodology. It raises a set of hypotheses but does not propose a way of studying the delivery of care and the staff required. If the pattern or organization suggested were introduced, a different type of staff would be required. The proposed model suggests separation of clinical and nonclinical functions of the nurse. Clinical activity is that which is "intended to assist in preventing, reversing, or arresting a pathological state of the patient." This is vague and nonoperational in nature. More specificity must be included in order to lend itself to staffing application.

The article is provocative and as such should be kept in the literature review. It raises pertinent issues about staffing.

D9. Clark, Louise. "Can The Nursing Workload Be Measured?" *Supervisor Nurse*, Vol. 1, No. 7 (December 1970), 14–24.

Review

Purpose.—To measure nursing workload by means of a procedure that quantified patients' needs.

Rationale.—Nurses have been under pressure of increased workloads from shortages, and headlines such as "Nurses Have Too Much Time" are misleading. The nurse day is based on a 168 hour workweek. The nurse day is equivalent to 5 hours and the patient day is equivalent to 24 hours yielding a 4.8 patient day to one nurse day.

Since there is little correlation between direct care and census, the physical care unit (PCU) can more satisfactorily predict care needs. The intensity of care required is the factor in measuring patient needs.

Sample.—Three nurses and the medical director of the pediatric unit at the Medical College of Georgia.

Instrument.—Study by White, Quade, and White, *Patient Care Classification: Methods and Application*, Johns Hopkins University, Baltimore, Maryland (School of Hygiene and Public Health), 1967, was modified. Five intensity criteria identified by White are diet, vital signs, respiratory aids, suction, and cleanliness.

Procedure.—The time required to perform the various tasks was measured and associated with each intensity criterion in order to arrive at a quantity measurement.

As the study expanded, two additional criteria were added—toileting/output and turning/assisted activity.

The elements of physical care (e.g., respiratory aids) are the intensity criteria as described by White. Examples of the associated tasks are various types of elements of physical care such as bedside humidifier, croupette, cough, deep breathing exercises, and IPPB. Each of these associated tasks is assigned a point value equivalent to 7½ minutes per point. The points for each patient are converted into hours of physical care needed. A conversion table indicates the points, physical care units, and hours.

Results.—With the same census of two patients, the direct care needs varied from 4 hours on days to 2 hours on evenings to 1 hour on nights.

The system will work best in a hospital with an occupancy of 90 percent or greater.

The system can be used in planning for construction, planning for both nursing and paramedical manpower, and developing a fee-for-service payment system.

Critique

This article contains exciting ideas. It reports the effort of a group to look at the care that a patient requires and to quantify it on a basis of time converted into points depicting intensity of care. The authors draw upon the study by White, Quade, and White, *Patient Care Classification: Methods and Application.*

The article is too brief to provide sufficient information for an evaluation of the basic study. However, the use of a conversion table to simplify the process of estimating nursing hours makes sense. It should enable one to establish a documentation system that can be readily understood.

D10. Claussen, Esther. "Categorization of Patients According to Nursing Care Needs." *Military Medicine*, Vol. 116, No. 3 (March 1955), 209–214.

Review

Purpose.—The purpose of this article is to describe a practical method for determining the nursing care needs of patients and to discuss its application in an Army hospital.

Under the guidance of the Hospital Methods Improvement Branch, Medical Plans and Operations Division, Office of the Surgeon General, the method was developed at two large Army hospitals.

In the process of developing a system for defining the nursing needs of the individual patient and classifying each patient, a range from three to nine categories has been tried. Three categories were found to reflect nursing needs of patients hospitalized on active wards and one category for patients whose needs for nursing care are so limited as to not require professional nurse coverage. Factors that influence classification are • nursing procedural requirements, • physical restriction, • instructional needs, and • emotional needs. These factors relate directly to the work generated by the patient, doctor, and head nurse. The degree of observation, the number and complexity of medications and treatments, as well as the physical restriction that must be imposed, will reflect the individual medical regime. The analysis by the head nurse determines the amount and type of psychological support and the extent to which procedural and instructional requirements may be adopted without loss of therapeutic value.

The effects of classifying patients according to their nursing care needs are • better planning follows at the nursing unit level, • nursing activities above or below the capabilities of the staff become evident, and • job performance of all levels of the nursing team are consistently analyzed.

Data, accumulated on the categorization of patients, were collected for 1 year at the U.S. Army Hospital, Fort Belvoir, Virginia.

The categories are generally described indicating that patients in each category represent intensive, moderate, minimal, or no nursing care. The patients in Category D, representing need of supportive care only, met five specific criteria: go to dining hall for meals; accomplish all acts of self-care; aid in cleaning quarters; make own bed; and require minimal supervision by nonprofessional nursing service personnel.

Daily observations and activity analysis in the Clinic Quarters for the Category D patients showed that the nature of the workload was concerned primarily with coordination of appointments to various inpatient and outpatient treatment facilities.

The average daily census during the first 6 months was 453 patients, 115 patients housed in Clinic Quarters. Eight percent required intensive care, 42 percent moderate care, 42 percent minimal care, and 8 percent supportive care. Based on the number of nursing personnel assigned, 1 hour of professional nursing care and 2 hours of nonprofessional nursing care per patient day were provided. Thirty percent of the 3 hours of nursing care per patient per day was provided by the professional and 70 percent by the nonprofessional nursing staff.

During the second 6 months, the average daily hospital census was 424 patients; 123 of these patients were in Clinic Quarters. Ten percent required intensive care, 41 percent moderate care, 44 percent minimal care, and 5 percent supportive care. Of the nearly four hours of nursing care available, 25 percent were available from the professional staff.

Comparative analysis showed that the same amount of professional nursing time was available, but the levels of nonprofessional personnel and amount of care they could provide were varied.

The increase of 1 hour per patient by nonprofessional personnel during the second 6 months was due to the addition of clinical technicians to the nursing staff. The clinical technician is trained in an Army school and may qualify for licensure as a practical nurse. The author stated that nursing service provides a higher quality of nursing care since the addition of clinical technicians to the staff.

Review of hospital records shows the average length of patient stay for military personnel to be 12 days as opposed to 5 days for dependents during both periods. The age range was from premature infant to 87 years.

Range of available nursing hours varied as reflected on the medical service. Available professional nursing time varied from 1 hour on the contagious ward to one-third of an hour on the general medical wards.

In estimating the adequacy of the number of hours provided for patient care, it is necessary to assess the extent to which nursing service is charged with responsibility for activities essentially nonnursing in nature.

Categorization can play the vital role in establishing staffing patterns and requirements.

Critique

This article describes a method of categorizing patients in a military hospital into four categories based upon four factors: • nursing procedure requirements, • physical restriction, • instructional needs, and • emotional needs.

The article does not include the tools used in the classification scheme or a description of its use. Tables provide data about distribution of the population of patients over two 6-month blocks of time and distribution of number of hours per class.

Since the article presents little methodology, it is not a particularly useful reference.

D11. Connor, Robert J. "A Work Sampling Study of Variations in Nursing Work Load." *Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 35, No. 9 (May 1961), 40–41 and 111.

Review

A work measurement study was undertaken to determine how total nursing workload varies.

The study was designed to determine the relationship between nursing workload (ward medical units from 7 a.m. to 6 p.m.) and direct care index, census, and number of nursing personnel.

Productive activity is defined as direct patient care, indirect patient care, paperwork, communications, and other such as patient escorting, errands, cleanup, and travel. All other activities were classified as personal time and considered as nonproductive.

The work measurement technique that was used was work sampling because work sampling would obtain efficient and economical information, was recommended, and had been used successfully on nursing units.

Analysis shows that time spent in direct patient care is related to the direct care index. This time is not related to nursing hours available as reflected in the fact that time with patients did not increase or decrease as hours of work did. Total workload varies significantly with direct care index and available hours but not with census. The hours available have a significant relationship to the total nursing workload. Nonproductive activity is a function of the direct patient care load and available hours.

Critique

This report on a work sampling study, undertaken to investigate causes for variations in the direct care index, concludes that as nursing hours increase there is no increase in direct patient care, but there is an increase in personal time. The conclusion has obvious implications for staffing and supports the thinking that too many nurses are not only costly but ineffective.

Due perhaps to the brevity of this report, there is no mention of the sample size, observer training, or random sampling procedure. The distinction between types of productive activity and nonproductive activity is such that observed consistency must be established in order to obtain reliable data.

The conclusion that the direct care index varies as the workload varies can be interpreted to mean that the index is a measure of care requirements, provided the index is valid. If the index is valid, when available hours are increased, the only increase in nurses' time is in personal activities. However, since much information is lacking in the article, the reader cannot logically come to this conclusion.

D12. **Connor, Robert J.; Flagle, Charles D.; Hsieh, Richard K. C.; Preston, Ruth A.; and Singer, Sidney. "Effective Use of Nursing Resources—A Research Report."** ***Hospitals, J.A.H.A. (Journal of the American Hospital Association),*** **Vol. 35, No. 9 (May 1961), 30–39.**

Review

Problem.—A research group representing several academic disciplines was formed at Johns Hopkins University and Hospital. A principle effort was directed toward problems of matching nursing resources, particularly nursing to patient needs.

Rationale.—There is a great range from day to day in the hours spent by nurses in direct care of patients. The design of an organization to accommodate efficiently such wide swings in demand on its resources poses a difficult problem. The number of critically ill patients is determined by chance, and no single level of staff or supply is suitable. Flexible and sensitive guides to allocation of resources are necessary if goals of economy and consistent standards of care are to be achieved.

A direct care index was developed to observe and measure the degree of patients' needs. From this a daily measure of patient needs and number of daily nurse hours required to provide current standards of care are determined. The most significant reaction that can be taken to change the index is the movement of nursing personnel or patients so as to match nursing resources. It was the plan of the investigator to extend his study to involve the whole range of nursing activity from direct care to administration.

It was concluded from earlier studies that a total system, a coordinate plan for balanced utilization, was needed: • professional and auxiliary nursing time, • externally purchased service and supply, and • increasing capabilities of administrative and ancillary personnel.

The hospital made three major adjustments in preparation for the study: • one ward of Oster Medical Clinic at Johns Hopkins hospital was designated as experimental for detailed study and for the purpose of developing new systems of staffing supply and operation, • the hospital adopted many labor-saving procedures and items of equipment for use throughout the hospital, and • the hospital applied for a research grant since the problem was considered a universal one. Suggested changes were made in the experimental areas: patients were escorted to radiology, housekeeping absorbed many duties, central stores supplied works automatically. Central supply was established and many prepackaged disposable items were used.

Earlier studies led to the conclusions that no single level of staff or inventory could be ideal and the rise and fall in workload depended on the number of critically ill patients.

Methodology and Findings.—A work measurement study was conducted by observation of nurses performing direct care. Continuously groups of four patients were observed. Minutes spent in performance of elements of care were noted against time of day and level of personnel engaged from 6 p.m. to 12 midnight. Observed patients were selected randomly after stratification according to sex, service, and condition. Observed performance time for personnel categories was totaled and hour of day defined. Uneven distribution of workload was noted, in that heavy loads were during the morning and light loads during the evening. Seventy-five percent of observed direct patient care was carried out by student nurses and auxiliary personnel. Results are presented in table form.

Nursing time was standard. Patients were described according to need levels: mobility, state of consciousness, emotional state, adequacy of vision, and need for isolation. These were considered problems areas for nursing. Care classifications of patients based on observable factors were developed for the patient sample and average care times were determined for each level of patient: I. Self-Care—27 minutes, II. Partial Care—53 minutes, and III. Total Care—137 minutes. This is presented in graphs.

A hospital wide classification system for patients was developed to (a) determine their ability to classify patients from a questionnaire, (b) learn the composition and behavior of the patient population, and (c) simplify and clarify original definitions.

A questionnaire was developed for the nurse to classify each patient. This classification required too much time—it was condensed into a form, which is included. Validity of the form was tested by classifying patients prior to the observation of the service performed for them. This verified the original conclusion for determining time spent with patients in each class.

The questionnaire was used to *study the nature of the variation of the number of self-care, partial care, and total care patients* (graphs are included). It was found that each component of the census is highly variable. Intensive care patients were most variable and varied greatly in numbers from floor to floor. Estimated daily total hours of direct care were computed by multiplying the number of patients in each class by average care time and adding the three products. Direct care workloads varied from 15 to 35 hours. During February and March a large increase in intensive care patients occurred altering the plan in developing staffing patterns. Cues obtained from the data are • care patient population followed a Poisson distribution —this implied the ability to predict the limits within the intensive care census; • the absence of correlation of intensive care patients between floors indicated that the range of intensive care census of several units taken together was proportionately less than for a single unit. The research was used to *relate the use of linen supply to the variation in patients' condition and census.* Counts were made of hospital linen for specific patients. Total care patients required three times as much linen as other patients. Linen usage varied as number of total care patients and census varied. The fixed standard of 60 sheets was changed to a variable daily standard that narrowed the gap between linen supplied and linen issued.

Application of the research to management included • classification systems were extended to the entire hospital, estimated hours of directed care are computed and reported on a summarized form, which is included; • the index for assignment was used for assigning overtime hours and nursing pool; and • the direct care index was considered a gross indicator of shifting needs for nursing time. The next step to be determined was level of skill required. Work sampling studies of nursing activity showed a simple linear relationship between productive care and direct care index. This implied that indirect care and administrative work are not greatly affected by the amount of direct care given. The system in which the staff is varied with need is called controlled variable index.

Direction of the research was toward:

- The establishment of standards of care; methods established in the research study accepted the level of performance.
- The improvement of methods to predict more than 1 day in advance. This would involve study of patterns of patient admissions, discharges, length of stay in and transitions between various categories to develop an analytical model of the dynamics of the inpatient ward population. Predictions would be made on a probabilistic basis. This was in progress.

Conclusions.—

- There are wide variations in hospital resources but workloads can be balanced by sharing resources from floor to floor on the basis of continuous objective measures of patient need.
- The technique of classification of patients provides a feasible mechanism for daily estimates of patient needs for nursing time.
- Economic utilization of resources calls for flexibility in assignment of personnel and allocation of facilities and supplies, requiring a shift away from autonomy of small units.

Critique

Effective use of nursing resources is the basic issue in nurse staffing methodology, which makes the title of this report extremely relevant to the question of staffing. However, this research report, published in a hospital periodical, is brief, and the reader is referred to the authors' basic study of classification systems.

The theoretical framework of this report acknowledges the variability of patient needs and the limited effect of labor saving devices on nursing workload.

This report of a study undertaken at Johns Hopkins University and Hospital examines the method of observation of patients to determine what types of patients require certain levels and amounts of personnel time. Because the method of observer training and the number of patients observed are not included in this report, the results relating to the amount of direct care given by certain levels of personnel are questionable. The reliability and validity of the questionnaire used by head nurses were tested against the observation study. The use of graphs to show the gyrating character of workload shows the variablity of workload but not necessarily the source of this variablity. The conclusion that sharing of resources can help the problem caused by a varying mixture of patients is neither proved or disproved by this investigator. That classification techniques are helpful may or may not be true in terms of patient care received. The third conclusion, that assignments of personnel and allocation of facilities need to be flexible, is supported, but the question remains as to how effectively nursing personnel are utilized.

The specific innovation that patients can be classified to determine workload is a major contribution to staffing methodologies. However, the validity of this classification system and the amount of care required by different categories of patients must be truly separate and distinct in order that the classification system can be used to determine personnel levels.

This classification system can be readily translated and has been used extensively in current publications, but the question of validity and reliability of the basic classification system will affect the applied study's results.

D13. Dunn, Margaret A. "Development of an Instrument to Measure Nursing Performance." *Nursing Research*, Vol. 19, No. 6 (November-December 1970), 502–510.

Review

Purpose.—To construct and validate an objective measuring instrument to be used by nurse supervisors during the observance of the performance of professional nurse practitioners.

Hypotheses.—(a) Nursing supervisors applying the behavioral instrument will rate, with a high degree of agreement, the performance of 35 professional nurse practitioners. Positive correlations will exist between ratings, as well as congruent mean ratings between the two raters.

(b) There will be a high degree of agreement between each of the five nursing procedures throughout the observed performance. Each of the five major areas of scientific principles supporting the five procedures will be consistently applied throughout the performance of the participating nurse practitioners as observed by two supervisor raters applying the research instrument.

(c) Knowledge of nursing principles will have a high positive correlation with the observed performance of 35 professional nurse practitioners on the five selected nursing procedures as measured by the instrument.

Sample.—Thirty-five professional nurses in one large Federal hospital who were responsible for the practice of the five selected nursing procedures.

Instruments.—Nursing Principles Test was used to measure the nurses' knowledge of scientific nursing principles. This test was part of a large, longitudinal research project in progress in the Federal hospital. The test was designed to encompass the many nursing procedures required in the daily practice of nursing skills in a general hospital. The test required 2 hours to complete and was administered to each participating nurse the second day of her employment. It had been administered to 300+ professional nurses and had a reliability of 0.900. (Hoyt, Cyril. "Test reliability obtained by analysis of variance." *Psychometrika* 6–:153–160, 1941).

The Professional Performance Rating checklist form included checklists for five procedures. These procedures were tracheal suctioning, administration of tube feedings, administration of oral medications, administration of intramuscular medications, and administration of intravenous solutions. Each of the procedures is performed in any general hospital, incorporating many principles repeated in other nursing procedures, and is readily observable at the bedside. The step by step behavioral analysis was based on a review of the procedural manual and many observations. The criteria applied in developing the task analysis incorporated a thorough review of the literature on nursing practice. Physiology, pharmacology, microbiology, psychosocial, and physics were the five major scientific areas that provided the principles supporting the expected behavior for the particular task steps. The checklists for each nursing procedure included individual steps required in the completion of the procedure expressed in behavioral terms and the scientific principle supporting the behavior.

Content validity was established by a review of nine nurses expert in medical-surgical nursing. Weights (one to five) were assigned to each behavioral task of the procedure. A guide for the assignment of weights was arbitrarily presented to the panels and was as follows: five points—professional judgment, four points—surgical sepsis, three points—medical asepsis, two points—patient centered, one point (lowest value)—care of the environment. The second panel reviewed the research instrument and recommended minor changes.

Procedure.—Two nurse supervisors participated simultaneously in the use of the instrument observed, each nurse performing one of the five procedures. Each of the two supervisors independently observed the same nurse practitioner perform the same procedure. Observations were made on all tours of duty throughout each day of the week. The correlation matrix of rater observation was constructed by means of Pearson product-moment correlation coefficients to measure interrater reliability.

Total scores for each of the five nursing procedures and total scores for each of the major categories of scientific principles for each administration of the instrument were analyzed. All scores over all administrations were summarized. Fifty-five different total scores were obtained for each nurse. Corresponding means, standard deviations, and reliability of total scores for separate administrations were computed. Intercorrelations of total and part scores were obtained on one administration. Differences between correlated means were computed by students "t" test.

Findings.—The nurse supervisors expressed a high degree of agreement in the analysis of performance of all subjects in the five nursing procedures. The use of the research instrument indicated a high degree of agreement between two nurse supervisors rating in the same situation ($r=1$ to $r=.895$). Total scores for all observations from both raters in the same or different situations ranged from $r=.533$ to $r=.996$. A count of the time interval for the observation showed that the score on the procedure did not vary significantly if observed later the same day or several weeks later. Of the 70 situations, there was only one significant difference between nurse supervisors observing performance. Therefore, hypothesis (a) was accepted and the research instrument appears to be reliable.

One positive relationship was found between the two nursing procedures of administration of oral medications and intramuscular medications. The application of scientific principles supporting the procedure was found to have low positive correlation in four of 10 intercorrelations indicating inconsistent application of scientific principles. Computation of the means and standard deviations, preparation of an index of difficulty, and preparation of a coefficient of variation for each nursing procedure were additional descriptive analyses computed for each nursing procedure and area of scientific principles. The index of difficulty was computed to show the relationship between maximum possible score and observed score for each procedure. The computation of the coefficient of variation indicates the stability of the research tool.

On the basis of the observed performance, the administration of intramuscular medication was performed better and therefore the least difficult procedure to perform. The most difficult procedure or the least well done procedure was tracheal suctioning. The minimal variation shown by the coefficient of variation is that performance is homogeneous in all five procedures. The least difficult principle to apply was that of physics and the most difficult or least applied was that of microbiology. The coefficient of variation for the psychosocial scientific principle varied widely. However, less variation for total scores than for part scores indicated the higher reliability of total scores. Since there is not high correlation among all nursing procedures and supporting nursing principles, hypothesis (b) is rejected.

No relationship was observed between nursing performance and the Nursing Principles Test. The five nurse practitioners who scored highest in the principles test rated below the mean in nursing practice. The five nurses who scored lowest on the principles test rated above the mean in observed nursing practice. Hypothesis (c) is rejected.

Conclusions.—The instrument possesses a high degree of internal consistency for all applications by both raters. The task analysis for each procedure provides the nurse supervisor with a tentative list of "ideal" behaviors. The discrepancy between Nursing Principles Test of knowledge and the performance of skills at the bedside could indicate that the method or instructional context should be changed.

Critique

A related question in any consideration of staffing is the matter of adequacy of personnel performance. Few individuals would refute the statement that nursing staff should be appraised for knowledge and skill, especially during their introduction to the particular group of patients for whom they provide care. Furthermore, the relationship between adequacy of performance and staffing requirements is obvious. A staff member who is incompetent is equally as serious a problem as a situation in which staff members are lacking.

This is a thoughtfully conceived and designed study that is carefully carried out. The problem is significant, the hypothesis well stated, and the approach standard. The innovative feature is the task analysis of the procedures to be performed by the nurses observed and the linkage of the tasks to a principle from the basic services. The author presented in this release a limited theoretical framework for the study. However, she included an adequate description of the design of the instrument, the test for its content validation, the test for reliability, and the results. The rejection of two of the hypotheses has implications for both educators and administrators. It points out that some assumptions made by these groups about knowledge and its translation into practice may be false.

This study is only indirectly related to nurse staffing. However, it is significant. To be concerned only about prediction of numbers of staff is very short sighted. One must be deeply concerned about the ability of the individuals to practice nursing effectively.

D14. Edgecumbe, Robert H. "The CASH Approach to Hospital Management Engineering." *Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 39, No. 6 (March 16, 1965), 70–74.

Review

Historical background.—In 1963 CASH was established. It was an incorporated, nonprofit organization established by a large group of southern California hospitals with the guidance of the Hospital Council of Southern California and Blue Cross of Southern California. It was formed as an outgrowth of the Administrative Service Center Advisory Committee, the hospital council that recommended its formation.

CASH provided over 80 Southern California hospitals with management engineering services, the first effort to improve hospital services through modern management engineering techniques. A small fee was charged according to hospital size. The staff consists of five professional engineers.

Program objectives as stated by Samuel J. Tibbitts, president, are (a) to train hospital supervisory personnel in scientific management and industrial engineering techniques and assist in their operation; (b) to assist hospitals in establishing their own performance standards, personnel staffing, and departmental organization; and (c) to use the resources of the 80 member hospitals for developing improved methods and procedures and to communicate these accomplishments for the benefit of all through monthly conferences of the nine regional groupings of the eight participating hospitals. These conferences would include: (a) development of a framework for utilization and control of programs for all major hospital departments; (b) discussion of the progress made in the research; and (c) presentation of case studies involving significant methods improvements.

Application of principles and techniques of modern management were emphasized, to be accomplished by daily visits of CASH consultants to their block of hospitals for counseling and guidance on special projects. Training programs in principles and application of work simplification and work measurement were instituted.

Methodology.—In 1963, an indepth survey of nursing service was made. An advisory committee of four nursing directors appointed by the Hospital Council of California Nurses' Association Liaison Committee met with CASH about once a month.

The survey was done in three phases. Phase I involved CASH subscribing hospitals. Data were gathered on primary nursing service activities common to all short-term general hospitals. Variables as to type, size, range of services, teaching status, nursing practice, and unit organization were considered. Facts on the manner and frequency of certain basic care procedures were compiled. In light of the collected data, a representative sample (30 hospitals) was selected to measure total care and service required.

In Phase II, an intensive study of practices and procedures in administering total nursing care was made during the survey period. These included (a) formulation of a method for determining proper staff relationships to patient load for each shift of operation; (b) establishment of basis for predetermining daily workload, based on census and patient mix; (c) sending monthly reports to each hospital showing its relative utilization index to other comparable hospitals and their established standard.

Phase III involved implementation of developed data, statistics, and measurements. One unit in six representative hospitals was studied and the staff was oriented to the approach. Work distribution charts were evolved for a 24-hour period for each test unit. Activities were recorded for each hour of a 24-hour period in terms of standard staff required for each hour of operation and related to the standard range for each shift. The activity profile was analyzed by supervisory staff nurses and the workloads were redistributed.

Analyses of the work distribution charts results were • smoothing out the transition between shifts; •preplanning and scheduling shift activities to reduce "peaks and valleys"; • scheduling personnel lunch periods allowing greater flexibility for emergencies, planning, and scheduling activities on an exception basis; • development of a combined patient care plan and personnel assignment schedule; and • practice of patient centered care.

Supervisors formulated their daily workload plans after an analysis of the charts. CASH provided daily staffing patterns for each shift for average workloads and a staffing guide based on staffing requirements for each shift. The guide allowed the charge nurse to predict staffing requirements for each shift on the basis of "census and patient mix."

Results.—The pilot study was considered highly successful, consequently the techniques were explained to all hospitals in the program. Man hours and cost were greatly reduced, 1.35 hours per patient day.

Due to absence of objective measure of quality of patient care, CASH was providing tests in this area that were subjective in nature.

In evaluating the effect on quality the following was noted: • improved communications and cooperation between shifts resulted in daily preshift preparation; • reduced work "peaks and valleys" through improved planning and scheduling; • simplification and standardization of major nursing procedures, resulting in improved organization of work and reduction in the possibilities of errors; • improved staff balance, increase in the proportion of registered nurses and their patient contacts; • objective production of daily staff requirements through the use of the staffing guide; and • introduction of utilization control charting. Quality control techniques were in the early stages of research. Nurse supervisor groups with each consultant were studying the improvement of procedures; e.g., charting and medications. Thirty percent time reduction and reduced error opportunities were accomplished in the medication procedures. Each improvement was tested, then presented to CASH hospitals in the monthly conference.

The author states that it is increasingly evident that the CASH concept is sound: working together in research on problems common to all and tailoring the results for each individual hospital. He states that management skills have been developed and strengthened. The potential results of this concept, he states, promises to be even more productive.

Critique

Since a large portion of the work of CASH has concerned itself with nurse staffing, knowledge about the approach of this group of management engineers and the underlying philosophy of the commission and its develoment is useful in weighing its contribution to nurse staffing.

This article describes, in brief, the 1963 survey of nursing services conducted by CASH. The report lacks supporting documentation and detail, but it does provide an excellent overall view of the general approach. The article includes two figures to give the reader a picture of the format and type of material provided the group of hospitals. The article is written simply and matter-of-factly. Unfortunately, the author does not include his rationale for operationally defining nursing practice as a cluster of tasks. Little is stated about the engineering approach to work measurement and management and its application to specific hospital operations.

D15. Freeman, Ruth; Sheps, Cecil G; Tibbitts, Helen G.; and Lamson, Glenn G. "Patient Care Research: Report of a Symposium." ***American Journal of Public Health*****, Vol. 53, No. 6, (June 1963) 965–969.**

Review

Problem.—To define the term, "patient care," and to identify the phenomena involved in the patient care concept.

Methodology.—Two study sections of the Division of Research Grants, National Institutes of Health, saw the need to define the term, "patient care," a term that has been commonly used since World War II. It was the contention that patient care referred to relationships among a wide range of objects, events, and people that have to do with health and illness behavior. Research attempted in this area had failed because there was a lack of understanding of the "complexities of the context in which it occurs" and identification of the problems to be studied.

The chairman of the two study sections convened a small interdisciplinary group (names included) in an informal symposium to delineate the field and map it out. A synthesis of three components was found to be represented in (a) the way in which people cope with their actual and potential health problems—what happens to them when they become patients, receive care, and relinquish their patient status; (b) the patterns of practice followed by the health professions singly and together; and (c) the ways in which values, prescriptions, and skills of patients and health personnel affect one another.

Findings.—Seven broad classes of patient care problems were identified and some of the problems and questions in each category were delineated. Some of the inclusions of the categories are shown in this article.

The seven broad categories are:

- sociocultural contexts of patient care,
- dynamics of patient care systems,
- communications,
- the diagnostic process,
- quality of patient care,
- influences of various characteristics of patient care organizations upon professional practice,
- influence of organizational characteristics upon the movement of patients into and through the organization.

Economic aspects of patient care and design of patient care were two other broad categories discussed but not developed.

It is hoped, the investigators state, that this preliminary survey will provide an "integrative framework for research on the many problems in Patient Care."

Critique

The value of this article lies in its brief description of the concept of patient care and its elements and in the listing of patient care problems and questions. Staffing for care is closely related or is a part of many of the questions. For example, the variety of practitioners and agencies giving care and the conditions governing access to them and their use must be considered in defining the roles for the clinical specialist and the physician's assistant. Another question is, "For what categories of personnel is the patient the desired, reluctant, or abhorred focus of work and what are the consequences of this combination of circumstances for the patient?" The article provides perspective for an individual who wishes to become broadly informed on the delivery of health care systems and concerns expressed about patient care.

D.16. Georgette, Janet Kinney. "Staffing by Patient Classification." ***Nursing Clinics of North America*****, Vol. 5, No. 2 (June 1970) 329–339.**

Review

This methodology is a modification of that designed by CASH,[8] in that it reflects some change in the assumptions about the dimensions underlying care of patients and enlarges the classification from three categories to four, excluding the centers for the critically ill. It also approaches the central core staffing differently, in that the basic staff on any unit remains the same and for days includes only registered nurses, one licensed vocational nurse, and a unit secretary. The methodology recognizes that standard hours may be assigned to a typical medical-surgical nursing unit for 24 hours.

In brief, the steps of the methodology are these:

(a) the recording of number of procedures on a daily basis and the calculation of standard hours per day for each unit (number of procedures × predetermined standard time);

(b) the calculation of distribution standard workload by shift over 24 hours,

(c) the classification of patients by application of a guide, placing patients along a continuum of acuity of illness (from nearly self-sufficient to needing intensive care),

(d) the development of category time ratios. These were computed from standard hours and prorated by shift. A chart was prepared showing required hours per category of patient and contained the prorated hours for each shift.

(e) the establishment of a central core staff for each nursing unit. For days, it includes a head nurse, two registered nurses as team leaders, a unit secretary, and a licensed practical nurse. The rest of the staff are attendants.

(f) at the end of each shift, the prediction of the number of hours of nursing required per shift by classification of patients and census based on what the census will be for the oncoming shift, and

(g) the calculation of number of hours required per shift by totaling the sums of number of patients in each category/number of hours required by each category. This total is then divided by eight to determine the number of personnel needed. If the answer includes a fraction less than half, it is dropped. If 0.5 or more, a nursing atendant is assigned.

The total number of permanent personnel is calculated at 80 percent occupancy of the nursing unit. (The article does not describe the number of patients in each category since this is reflected in the ratios assigned.) The patient classification scheme includes descriptive statements about each category of patients and what they require for • activities of daily living, • general health, • treatments, • medications, and • teaching and emotional health.

Staffing is reviewed every 8 hours and a record is kept of 24-hour staffing.

Only a brief statement is given about quality control.

The centers of critically ill patients are staffed without variation.

Critique

This methodology is an adaptation of that used by CASH, in that it includes changes that reflect more precise patient classification and it's concept of a basic care staff for nursing units. It is a significant article in that it shows a check on some of the assumptions made by CASH, and it does attempt to tighten the methodology, not scientifically but by use of logic and face validity.

There is no theoretical framework provided as basis of the methodology. There is no attempt to test for observer agreement in the application of the method, or to check on face validity by use of experts, or to estimate reliability of the scheme through test retest means. The use of nursing attendants in the central pool for meeting additional care requirements when changes in census occurs can be challenged. This concept fails to recognize the knowledge base required for practice and the limitations presented by individuals trained in a short-term inservice program.

D17. Georgopoulos, Basil S., and Christman, Luther A. "The Clinical Nurse Specialist: A Role Model." ***American Journal of Nursing,*** **Vol. 70, No. 5 (May 1970), 1030–1039.**

Review

Purpose.—To create clinical nurse specialist positions, fill them with competent persons, and then evaluate the effects upon nursing practice and patient care as well as upon the role expectations for the nurse specialist developed by those interacting with her at the patient unit level.

Hypothesis.—"Patient units led by clinical nurse specialists should eventually show not only significant differences but also overall clinical superiority (in terms of quantity and, especially, quality of nursing practice) over patient units led by traditional head nurses."

Methodology.—Six 25-bed medical units were utilized; three as experimental and three as control. A clinical specialist was assigned as team leader to each of the experimental units. Of the three control units, one remained under the same head nurse, constituting a "classical control" unit; the second unit under a traditional head nurse (but not the one it previously had) constituting a "modified control" unit; and the third was used as a "quasi-experimental" unit, being assigned as a team leader a nurse with qualifications comparable to those of the other two head nurses, who attempted to simulate as best she could the clinical nurse specialist role.

Data were collected over a 13-month period at three strategic times; i.e., pre-experimental, the month prior to the experiment, midway in the experimental period, and during the final weeks of the experiment. Data were obtained from questionnaires, interviews, intershift reports, individual patient kardexes, observation forms (completed by outside clinical nurse specialists), daily logs, patients' medical records, a "nursing activity study," hospital and nursing service data, and several "special assessment instruments."

The investigators translated the initial broad conception of the clinical nurse specialist role into several distinct but interrelated components. Five major classes of components were incorporated in the final role model: training and preparation for clinical practice, professional values and orientation, core functions and activities, relevant rights and obligations, and work relationships with others at the patient unit. These are delineated more specifically in the article.

Summary.—This article is the first report from a study being conducted at the University of Michigan. The focus of the report is primarily on the development of the role model for the clinical specialists. Research findings will be reported in subsequent articles.

Critique

The impact of a new role on the nursing care system and the changes in staffing that may result merit attention. The content of the article is, therefore, indirectly related to nurse staffing methodology. For example, questions that come to the attention of the reader of the article are these: Does the nursing staff under the leadership of a clinical nursing specialist perceive its functions differently and perform different nursing functions from those traditionally performed? If it does, what effect does this have upon the kind of staffing provided for the unit?

The final report of the study is not yet available. The value of this early release is in bringing to the attention of the reading public the fact that a major study is forthcoming and in giving a brief overview of it. The article is well written. However, in its brevity it provides no theoretical base, no rationale as to the placement of the clinical nursing specialist in the team leader role, no description of tool development and testing, and no data upon which findings are based. Therefore, one can make no judgment about the scientific merit of the research that the article describes.

D18. Gordon, P. C.; Wanklin, J. M.; Harvey, N. H.; and Hatcher, G. H. "An Approach to Patient Care Classification." *Canadian Medical Association Journal*, Vol. 95, No. 24, (December 10, 1966) 1228–1236.

Review

Problem.—To present a practical technique by which a large number of hospital inpatients can be assessed quickly and classified into defined levels of care.

Assumptions.—(a) The patient care classification process assists in more economic use of existing hospital beds, (b) offers a level of care more appropriate to the needs of the patient, and (c) provides data that can be used for planning additional hospital and related care facilities in the community.

Method.—A general teaching and referral hospital in the Halifax-Dartmouth metropolitan area was studied. Psychiatric and eye and ear, nose and throat wards were not included in the study. The survey covered 6 weeks, July 6 to August 21, 1964. Three weekdays out of the 6-week survey were chosen at random for study. One third of the beds on the ward were to be surveyed on each of the 3 days;

the composition of each third was to be divided through a random division of the total number. Some modifications in sequence of days were necessary. There were 265 patients studied.

Routine on survey days: (a) authors extracted diagnostic information from the charts of patients to be studied; (b) nurses were oriented to the study and completed a 55 item questionnaire regarding diagnostic, therapeutic, and nursing procedures for the selected patients; and (c) physicians were oriented to the study and then classified patient care required to meet medical needs for the patients that day. Physicians were directed to (a) make a judgment as to the level of care required to meet the medical needs of each patient on the survey day, (b) assume levels of care were actually available in the community, and (c) disregard socioeconomic factors of the patients, and answer 10 questions about planned diagnostic and therapeutic procedures. Outside observers classified patients into the six levels of care from information on the questionnaire.

The levels of care defined in the article are based on those described in the publication *Concepts of Progressive Patient Care* with some revisions. The six general categories are:

(1) intensive care,
    (a) critically ill,
    (b) patients undergoing intensive investigation;
(2) intermediate care;
(3) minimal care: convalescing patients, patients awaiting surgery, transfer, etc.;
(4) long term active treatment hospital care;
(5) nursing care where patient's condition is under medical control; and
(6) sheltered care, custodial care.

Results are expressed in terms of the observers' classifications assuming that they were more consistent than those of the physicians. The first three levels grouped are referred to as "hospital levels"; the last three where facilities are provided outside the hospital are referred to as "alternate levels." In the analysis of the data, comparisons were made between hospital levels and alternate levels and between the levels within each of these groups. These are expressed in numbers and percentages (shown in tables). Where differences existed and numbers were insufficient, levels of significance were determined with the chi-square test.

Variables studied and results.—Variables studied are six: (1) *Care by service.* Ninety-six patients were assigned to alternate care. Of these, 19 percent were assigned to long-term hospital care, 12 percent to nursing care, and 6 percent to sheltered care. Of those assigned to the hospital level, 6 percent needed intensive care, 27.6 percent intermediate care, and 29.8 percent minimal care. There were highly significant differences on services in distribution of patients between hospital levels and alternate levels when assigned according to services, (P-.001). A high proportion of surgical patients were shown to need minimal care. This number was not greatly influenced by numbers of preoperative patients. (2) *Levels of care* examined by region of residence showed that more than half of the patients were from outside Ralston County. This fact was shown to be related only to level of care assigned in the hospital. There were fewer in the intermediate care level within the hospital. (3) *Level of care* and *diagnosis* were shown to be statistically significant between the hospital and alternate levels ($0.02<P<0.05$). Neoplasms and diseases of the digestive system were concentrated at the hospital levels. (4) *Days of admission* to the survey day showed that 85 percent of the patients assigned to the alternate level had been in the hospital a week as compared to 50 percent in the hospital level. There was a statistically significant difference between hospital and alternate levels ($P = <.001$). Hospital levels had higher proportions of short stay patients. (5) *Discharge efforts* were shown in 3 percent of hospital level patients as compared to 13 percent in alternate level after classifications had been made. This was considered to be a small number considering the shortage of available beds. (6) *Nursing observations* given to patients in the hospital care level versus alternate care level were not statistically significant.

Other variables such as age and marital status when classified according to levels were not statistically significant.

Comparisons for consistency of results of patient care classifications according to the outside observer and resident physician as to levels of care are as follows: the six levels of care showed 64 percent agreement for all levels and 81 percent agreement for hospital and alternate levels. Differences in extent of agreement according to hospital services were slight except on the neurosurgical service where agreement between hospital versus alternate care reached 92 percent.

Summary.—Certain deficiencies in the study were pointed out. The hospital was considered a typical one. The study was confined to the weekday population during the summer months. The nurses' questionnaire contained questions of limited value and was too long for the alloted completion time. Socioeconomic factors of patients were not considered and home care facilities not identified.

It was considered that the method was feasible and practical and could be used by residents and nursing staff to screen out patients suitable for alternate care. They could then be referred to social service for economic assessment and referred to appropriate community resources.

Critique

One set of major variables in the establishment of nurse staffing methodology revolves around the characteristics of the patients to be served by the nursing staff. The nursing activity (or work) evolves from the population to be served. Therefore, studies concerned with the testing of practical approaches for classifying patients are highly relevant to a review of literature on the subject of nurse staffing. The question of whether or not the patient truly requires the services provided by the institution in which he is currently placed is also valid.

The authors stated in the discussion, "In recent years increasing attention has been focused on the more efficient and appropriate use" of the facilities used by patients. The rising cost of hospital facilities and care and the misuse of professional health manpower have pushed individuals to find out how beds are utilized. The authors described their concerns about misuse of facilities and review a limited number of surveys pertaining to the question of the efficient and appropriate use of health care facilities.

This survey is limited to a relatively small (265) weekday population in one hospital. Data were collected over a 6-week period in the summer. Attempts were made to make the sampling on the wards fall into a random sequence. The instruments and tools were not described so the reader does not know how they were developed and tested. The protocol for the survey day is presented in detail. The statistical analysis of the patient population is elementary. The result of the classification by resident physicians and the outside observer was compared for consistency. No reliability checks of classification by the same rater were made.

In spite of the limitations, the basic idea of looking into simple ways of classifying patients so that bed utilization can be examined is commendable. The comparative analysis of the population along selected variables is also intriguing.

If the full report could be obtained, perhaps the reader may find that some of the criticisms had been dealt with in the investigation itself and some details were simply not reported in the article prepared for the periodical. For example, the finding that patients with neoplasm and diseases of the digestive systems were concentrated in hospitals rather than in other types of facilities gives rise to speculation as to why this was occurring. And does this make a difference in nurse staffing of these units?

D19. Gorham, William A. "Staff Nursing Behaviors Contributing to Patient Care and Improvement." *Nursing Research*, Vol. 11, No. 2 (Spring 1962), 68–79.

Review

Purpose.—This report deals with the procedures for developing a definition of the current role of the general staff nurse in relation to patient care improvement.

Premises.—The investigator states that the traditional functions of the staff nurse have changed. Some of the functions have been taken over by other hospital personnel and new responsibilities have been added. Excessive demands are being made on the staff nurse and "her job duties are in disorder." He states, "Dissatisfaction is inevitable, especially as the gap widens between the functional role and job expectations."

It is the investigator's feeling that the information from this study should provide sound guidance to administrators, supervisors, educators, and staff nurses for greater understanding of current functional roles of staff nurses.

It was assumed that the behavior of general staff nurses in contributing to patient care and improvement can be studied in a systematic manner.

Instrument.—The investigator, in the systematic identification of behavior, selected the critical incident technique to collect information about specific behaviors of general staff nurses that contribute to patient improvement. This involved the collection of reports of observed incidents having special significance that would meet systematically defined criteria. The incidents that were collected were classified according to the type of behavior involved.

Questionnaires were developed in which respondents were asked to recall and report specific incidents that they had observed or in which they had been involved. Three questionnaire forms were designed: one for general staff nurses; one for immediate station supervisors, nursing office supervisors, and physicians; and one for patients. Having a "variety" of opinions, they felt, gave a more comprehensive picture of the staff nurse's role. The questionnaire administered to general staff nurses asked her to report incidents of effective behavior where the nurse failed to do something helpful and two where the nurse may have done something harmful to the patient or hindered the patient's progress. One of the two incidents in the categories was to be self-reported and one incident was to involve another nurse. Questionnaires for supervisors and patients asked for one incident of each type. A page for each incident was provided so that the following questions could be answered: (a) What circumstances led up to the incident? (b) What exactly did you do? (c) How did this help the patient? The last question was considered most crucial as it was expected to provide evidence to the development of criteria of patient improvement.

Incidents were collected in 10 general hospitals in metropolitan Washington, D.C., in the summer of 1956. Hospitals were comparable in salary conditions, range of working conditions, patient conditions, and duty load. The research staff arranged for group interviews with members of the nursing and medical staffs, through hospital administration, nursing administrative personnel, and medical administrators in each hospital. The groups ranged in size from six to 50. Each group was given explicit instructions for answering the questionnaires. Confidentiality was guaranteed. Patient questionnaires were distributed by the nursing office supervisor to patients that she felt were able to complete them. Other questionnaires were given to patients by the research staff. The patients were selected by the floor supervisor. In all, 2,065 incidents were collected, of which 169 were eliminated because they did not involve staff nurses. Of the 1,896 incidents, 1,053 came from general staff nurses, [illegible] from supervisory personnel (including physicians) and 105 from patients.

A set of categories for classification were agreed upon by several of the research staff based on the behavior in the incident. As incidents were collected, categories were expanded and subgrouped until no new categories were necessary. Reliability was checked by two judges working independently. Out of 1,000 incidents, 84 were classified into the same categories. Fifteen categories of behavior were grouped into five major areas. The areas are defined and the specific activities included in each area are elaborated upon (a sample incident is described under each specific activity).

Area I. Improving patients' adjustments to hospitalization of illness. Behavior in this group consists of activities initiated by the nurse to alter the patient's emotional state and improve his attitude toward his illness and hospitalization, showing both effective and ineffective behavior. Two types of ineffective behavior are (a) failing to act, and (b) acting in an inappropriate manner.

1. Explaining conditions or treatment to the patient.
2. Helping the patient in relieving emotional tensions—providing reassurance.
3. Teaching patient self-care.

Area II. Promoting patient comfort and hygiene. The activities in the area are directed toward (a) increasing the patient's comfort, (b) preventing deterioration of the patient's general and physical condition and progress, and (c) fostering physical rehabilitation and healing.

1. Providing physical care.

Area III. Contributing to medical treatment of patients. Behavioral guides are based on (a) specific medical orders or hospital policies and routines, and (b) general and medical technical knowledge.

1. Carrying out medical orders.
2. Initiating medical procedures. This includes

situations of nurses' behavior covered by standing orders or PRN orders, behavior in emergency situations, etc.

3. Reporting on patients' conditions.
4. Using and checking operation of apparatus.

Area IV. Arranging management details.

1. Scheduling patients' treatments.
2. Directing the work of the nonprofessional personnel, assignment, instructions, and checking the work of auxiliary personnel.
3. Maintaining general supplies.
4. Referring patients to nonmedical sources such as social service, business office, Red Cross, Visiting Nurses' Asociation, etc.
5. Supervising visitors.

Area V. Personal characteristics.

1. Behaving in a warm, friendly manner.
2. Behaving in a professional manner.

A table showing distribution of the incidents into areas and categories for general staff nurses, supervisory personnel (including physicians and patients), and percentages of these incidents are included in the study.

Specific behavior found to be related to patient care and improvement were extracted as the first step in developing procedures for measuring nursing performance. Incidents were reread and the key behavioral statement in each incident was extracted. The statements were abstracted by selecting statements representative of the groups of statements. Criteria for the final set of statements were (a) concise wording, (b) specificity of action, (c) applicability of most, if not all, nurses, (d) clearness of expression, (e) use of original incident language where possible, (f) unit of thought, (g) absence of qualifiers (often or sometimes) and (h) avoidance of "Fail to . . ." statements. The analysis yielded 320 general statements.

Criticalness of behavior was determined "empirically" by (a) determining the degree to which each is a desirable behavior in relation to patient care (affect value), (b) the degree to which each statement differentiates between the best and poorer nurses (discrimination value). To determine affect value, 68 head nurses in eight hospitals sorted 320 statements in seven piles on a scale ranging from least descriptive of nursing performance. The affect value of each statement was computed by averaging its scale position. Reliability was checked by correlating the means of the first 34 head nurses doing the sorting with the last 34. A correlation of .97 was obtained.

Discrimination values were obtained by having 54 head nurses in the eight hospitals sort the 320 statements into five piles to indicate the degree to which each statement describes the performance of a specific staff nurse on her unit. The five piles were designated as follows: (a) statement always applies to the nurse, (b) applies most of the time, (c) applies about half of the time, (d) seldom applies, and (e) rarely or never applies. There was no forced distribution in these lists.

Discrimination index for each statement was computed by averaging its scale position for "good nurse" and "poor nurse" and subtracting the second from the first. Reliability was checked by correlating mean scale values of the statements sorted by the first 27 head nurses. High reliability coefficients found for the good group sort was .98 and for the poor group sort was .90. (Tables of affect and discrimination values are included in the study.)

To establish area and category weights as to relative contributions of each of the areas and categories, a form was devised and administered to 76 head nurses in the eight hospitals (form not included). They were asked to apportion 100 points among the five areas, and then distribute the points they assigned to each area among the categories in the area. A table of these results is shown in the study.

Results and evaluation by Mary E. Brackett.— According to frequency mentioned, the results indicate that physical care and characteristics of the nurses are more important to patients than to nurses. Medical care is mentioned twice as often by nurses as by patients. It is stated that from this study one might conclude that the need for physical care defers to the need for technical skills and emotional support of the patient.

It is suggested that information from these study results should be valuable in • developing job description of the staff nurse, • developing tools for evaluating nursing care, • developing tools for evaluating skills of nurses, • planning inservice education programs, and • developing staffing patterns.

It is the investigator's opinion that the behaviors

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have been judged by opinions and not by criteria for determining the effectiveness of patient care. She questions whether or not the purpose of the study has been met.

Critique

There is little question but that over the last years the role of the staff nurse has been changing. Too little attention has been given to what should be expected of her and how this relates to patient welfare. The investigators in this research have assumed that what the staff nurse is currently doing has a salutary effect upon the patient and that the other persons to whom the staff nurse relates can identify critical incidents involving effective and noneffective behavior. This article is a report of the first phase in a study of nursing behavior as it relates to patient care and improvement. This study preceded that reported by Flanagan entitled, "Specific Nursing Behaviors Related to Patient Care and Improvement."

The study was carefully designed and implemented. The sample of incidents obtained was large. Categories of behavior were established as the incidents were reviewed and reliability checks of classification were included. A great amount of care went into the extraction of the behavior from the incident and to its precise statement. Each behavioral statement was examined for criticalness and discriminatory value through forced sorts by head nurses. Reliability tests were carefully made.

The unfortunate aspect of this study, to which a great deal of thought, time, and money was given as well as meticulous attention to technical details, is that attention was not given to the fundamental question of whether or not nursing as it is currently being practiced is that which should be perpetuated. The basic premise upon which the research resides may be false.

D20. Hansen, Karl E. "How to Measure Nursing Care Time." *Modern Hospital*, Vol. 100, No. 4 (April 1963), 93–96.

Review

Purpose.—The purpose of this article involves the presentation of techniques to determine the utilization of nursing time in the hospital situation.

Methodology and instrument.—(The technique described in this article was developed by five hospitals and a firm of industrial engineering consultants.) The key to the system is the patient care report, a simple sheet. It can be adapted to any hospital and can be used on any shift. It can be kept by the team leader or nurse's station clerk to indicate time and amount of nursing care required for each patient.

Specific care requirements for each patient can be indicated on the sheet including care items required by doctors. A standard time for each item listed has been developed over a 2-year period in each of the five hospitals. These are printed on the sheets. Tallies made by the clerk can be counted, multiplied by the standard time to determine the required hours of nursing care, and required hours can then be compared to determine how well the staff is utilized.

At the end of each shift the clerk tallies the items of care required by each patient from the index file—"It is objective because it reflects doctors' orders and can be audited against the visible index file." This report must be designed and refined for each individual hospital. When this has been done, improvements in methods of nursing procedures are found. "When basic care time values by tour of duty (sample included) are established in a particular hospital and presented in nurse group meetings, improved procedure methods and savings in time invariably result." An example was cited. A major time-consuming item in a hospital situation was the requisitioning of drugs for each patient. The head nurse group proposed that the most commonly used drugs be placed in each nurse's station in order that patients could be individually charged. It was decided that the nurse's notes include the record of doses administered to each patient during the day. A copy of the daily nurse's notes forms (form included) was sent to the pharmacy, then forwarded to the business office where it was filed as a charge. Nurses were relieved of a "considerable amount of work," and the amount of work in the pharmacy was reduced 60 percent.

The process of examining every nursing task in terms of what is done, how it should be done, and how long it should take, helps to define quality of nursing care. If the head nurse or supervisor observes a nursing procedure being completed in less than the established time, one could conclude that the quality of care is suffering.

Information acquired through these processes was found to be valuable in the objective evaluation of personnel when work done in relation to quality of care and of time required for the task was assessed. Hospital nursing services have reported on the improvement in personnel's morale because the nurse knows what is expected of her and knows that the patient care report provides an objective measure of her performance.

Listing of nursing tasks and evaluating items in terms of method and time, it was found, aided in objectively resolving questions of jurisdiction. It provided a method of determining if and by whom the tasks were to be performed.

Separate checklists provided for all three shifts over a period of a few weeks serve as a guide to show where staff is in excess or short. They also provide justification for staffing changes and assist in establishing new staffing patterns.

The report can easily be made out by the day shift nursing clerk for the day and night shift and for the evening shift by the evening clerk. Detailed care items are taken from the visible index file. Upon completion it is totaled and posted on the bulletin board. Time required to prepare the report was determined to be 2 minutes per patient bed.

Critique

This article reports the methodology for studying the use of nursing time in hospitals. It does not present ways of measuring the length of time required in the performance of specific nursing acts themselves.

The author refers to standard time requirements that have been set for basic care tasks, but he includes no documentation as to how those times were determined or as to the establishment of reliability and validity of the tools employed to gather the data.

The article is written in a simple style and contains examples of how the methodology has been helpful. It does not contain enough detail to make use of the method possible without further explanation of the procedure and tools.

An offshoot of this particular consultant firm's work has been the nursing program of CASH.

D21. Harris, David H. "Nursing Staffing Requirements." ***Hospitals, J.A.H.A. (Journal of the American Hospital Association),*** **Vol. 44, No. 8, (April 16, 1970), 64–70.**

Review

Purpose.—Analysis of nurse staffing to develop staff planning information.

Background information and overall results.—Nineteen Massachusetts hospitals engaged in a joint evaluation of their nurse staffing requirements, as related to adult medical-surgical patients, from March through September 1968. Hospitals ranged in size from 80 to 475 beds. Teaching, nonteaching, urban, rural, general, and specialty hospitals are included.

Nurse staffing management control plan of Massachusetts Hospital Association, Group System Engineering Program, implemented the analysis. Followup studies showed substantial improvements in increased productivity, cost control, and professional satisfactions.

A revised method of staff planning and scheduling, an objective evaluation of the 24-hour nursing care workload, is now used in the majority of the hospitals, resulting in a 3 percent to 10 percent increase in the level of nursing staff productivity and a saving of $500,000. A higher level of quality of care exists through continuous monitoring and documentation of performance quality.

Method.—The method is not fully described. Harris states that it is similar to the CASH method. An aggregate of information derived from the analysis and conclusions about utilization of personnel are presented. An analysis was made of actual nursing care requirements of a statistical sampling of adult medical-surgical patients on one or more nursing units in each hospital (390 patient days studied per unit). Patient care and related activities were recorded and the time required for each task was determined.

Nursing and engineering personnel formed the study teams. Activity times and frequency of task occurrence were scrutinized. Actual performance data were employed in forecasting of standard or norm performance.

Identification of patients receiving nursing care according to age, sex, type of service they required, and level of dependency was a key step. The relationship of required nursing staff levels and mixture to one or more of these characteristics is shown in earlier studies. Patient mixture and required nursing care hours per patient day are shown in tables 1, 2, and 3. The degree to which daily nurse staffing requirements vary in relation to patient characteristics, age, clinical service, and level of dependency is studied. Sex was not a significant factor.

Data analysis and findings.—Required hours per patient day (HPD) figures involving all types of nursing personnel, head nurse, ward secretaries, utility aides, team leaders and, in some instances, students were included. Analysis included direct and indirect patient care. Unit activities supervisors, service managers, and nonnursing department personnel are not included. Personnel breaks and normal delays are included. Mealtime allowances, inservice, or related activity times are not included.

Each hospital's required HPD depended heavily on particular positions present, methods of organization, work methods, scope of nursing responsibility, type of unit care, treatment policies, patient mixture and other factors. A 37 percent difference in average HPD among hospitals was found.

An attempt was made to identify certain hospital characteristics that correlated well with care requirements; none was found. It was evidenced (though not statistically proved) that the team approach coincided with the greater amount of nursing care rendered (3.66 HPD vs. 3.31 in hospitals not having the team approach). Improved communications, activities of a direct care nature, and contributions of nurses and LPNs to the care showed a higher level of care where team nursing was practiced.

Differences in care requirements of patients on day of discharge and admissions were found. Isolation of these care requirements, it was felt, would be significant in staff planning because these tend to be concentrated on certain days of the week.

Staff development was studied. The study approach included the personnel classification performing each task and the time of day the task was performed. From this information personnel productivity and skills deployment are evaluated. An average of 68 percent of care rendered to patients was by nurses and licensed practical nurses though there were great variations among hospitals. Table 4 shows percent of average care level by skill. The amount of time given patients by registered nurses was shown to increase as levels of patient dependency increased and a care contribution "trade off" between licensed practical nurses and aides occurred as patients progressed from complete care to minimal care.

Another element of staff deployment evaluation was the analysis of the distribution of care requirements for various time periods, shifts, and hours. HPD by shift according to level of dependency provides the heart of staff planning. Table 5 presents average patient care requirements by shift and patient type for all hospitals studied. Influence of patient mix on shift staffing requirements and overall staff productivity is included.

Figure 1 presents a summary of average workload distribution for a typical nursing unit on an hourly basis. This indicates the existence of peak demand periods and conflicts that can arise between scheduling of staff and patient load activities. This information helps to prevent aggravation of peak workloads.

Nursing productivity was evaluated by comparing actual levels of staff normally present to the staff requirements (productivity equals staff requirements divided by actual staff). An information gathering mechanism (not described) was instituted to permit continuous computation of productivity, and it included study of productivity in relation to changing levels of patient care needs. Table 6 reports initial study findings regarding productivity according to major skill levels and work periods present and overall average staff productivity. This provides a test of nursing management efficiency in regard to resource deployment and a basis for policy changes in regard to efficiency and cost. Findings suggest the presence of shortcomings in some hospitals.

It is suggested that workload peaks though not totally avoidable can be improved by rescheduling in departments other than nursing; e.g., surgery. Other rescheduling in the study hospitals that have proved effective are: time for routine medication, treatments and vital signs, staff coffee breaks, and visiting hours.

Skill level is considered a difficult problem to solve. Personnel competence, training and guidance, available time, motivation, and working in peak load are all factors mentioned that influence skill level.

Harris emphasizes the need for a 7 day a week staffing pattern so that staff can be planned and full productivity of personnel can be expected. Figure 2 shows required staffing, actual daily staffing showing great variations. Tendency to staff for the worst situation with only a weekend versus weekday pattern leads to poor utilization of personnel. The use of float pools is recommended as a means of increased productivity and scheduling equity.

It is pointed out that productivity of the nursing staff can be evaluated only by nursing supervisors, hospital administration, or the reimbursement official. Improvement potential, it is stated, is shown only by long-term programs such as the CASH and HUMP studies where 10 to 15 percent improvement was shown. Motivation to succeed is considered essential to success which, he states, is largely dependent on the priority given to case containment. It is recommended that through systems analysis, cost containment goal can be accomplished.

It is the author's contention that thinking be directed from the nurse shortage to a means of correcting lagging productivity, overstaffing, and reallocation of staff. He contends that there are only isolated pockets of nurse shortage within a given State. When properly located, there would be an abundance. Harris describes in chart form, figure B, how it can appear that there is a shortage of nurses when there is actually an oversupply. It is based on an evaluation of staff productivity by the participating hospitals of required HPD figures developed during the analysis. The problem of overstaffing, he contends, lies in misallocation and lagging productivity.

Conclusions.—The author feels that less time should be devoted to staff recruitment and more time devoted to effective allocation of personnel and restructuring the work environment to permit higher staff productivity. Regional hospital groupings should incorporate for proper distribution of personnel. Efforts to entice personnel from one hospital to another should be eliminated. This would result in the reduction of hospital care costs.

Critique

This periodical article describes an approach to the problem of nurse staffing in hospital settings. It is directly related, therefore, to the question of nurse staffing methodology, in that it attempts both measurement of patient care requirements and nursing activity. Furthermore, the author presented his findings to a steering committee that established standards (predictions) and a resulting staffing pattern.

The article presents in limited detail the steps of the study and the approach It provides no reference to research studies or to the methods employed by other groups. The method draws apparently upon standard industrial engineering techniques. The variables considered were patient characteristics (dependency level and degree of illness), estimates of time required for care, and work measurement of nursing activities. Sampling time was very short, only 1 week. From the article, one finds no evidence of training of observers, of testing for reliability, and of consideration given to questions of validity. Whether these were in fact treated in the process of examining the staffing needs is unknown.

The value of the article is its testimony. It implies that the approach which appears similar to others is feasible. The cost of such consultant help can only be inferred. The results of the recommendations, whether or not they were accepted, and the effect of the change upon staff morale and patient welfare are not reported.

D22. Haussmann, R. K. Dieter. "Waiting Time As An Index of Quality of Nursing Care." *Health Services Research*, Vol. 5, No. 2 (Summer 1970), 92–105.

Review

Purpose.—To describe a model of the patient care process based on queueing theory and to apply the model to a burn unit.

Methodology.—The nursing aspect of patient care is defined to include those functions which have direct bearing on the patient's welfare but are not the direct responsibility of the physician.

In this analysis interest centers on the variation of demand intensity over time and on the relation of performance time and frequency of nursing tasks to the number of personnel in a unit. From these considerations waiting time of demands for service can be determined, providing a measure of unit effectiveness in a qualitative sense, and allowing comparisons of alternative staffing for a given patient load, or determination of the effect of change in patient load.

The conceptual model includes a description of the arrival process, service mechanism, and queue discipline.

Two hypotheses underlie the demand arrival process (demand for nursing service). Hypothesis 1. The intensity of demand arrivals is directly proportional to the number of patients for which the unit is responsible. Hypothesis 2. The intensity of demand arrivals is proportional to the condition of the patients on the unit.

The assumptions underlying the allocation of demands for service to individual servers are (a) The head nurse may administer medications but does not otherwise serve patients directly. (b) With the exceptions of administering medication and providing certain emergency services, LPNs contribute direct patient service on the same scale as do RNs. (c) Aides do not contribute to direct patient care except in conjunction with a nurse. (d) Individuals within a given personnel category are equivalent and share the workload of that category equally.

The queue discipline is concerned with the order of service of demands. Two hypotheses regarding priorities are: Hypothesis 3. An inverse relationship exists between waiting time for service and priority of demand arrival. Hypothesis 4. As priority increases, added increments of nursing staff yield progressively lesser decrements in waiting time.

The Quantitative Model is descriptive and cannot prescribe an optimal level of the system. The model can provide an understanding of the behavior of the system in terms of waiting time and alternative conditions of the system; and with acceptable waiting times for demands of any priority specified as part of the system's performance criteria, it can provide a measure of the effectiveness of the system. In the mathematical specification of the model the equations must show Poisson arrival processes and uniform priorities or the model will not be analytically tractable. Demands of priority consist of demands for various nursing activities. The arrival time may be regular (q.i.d. medications) or irregular (emergency care, emotional support, etc.). Under the particular queue discipline assumed for the conceptual model, a demand of one priority level will displace all those of a lower priority in the waiting line but may not cut in on any demand that had already started servicing (queueing properties are explained and analyzed).

The nursing operation on a medium sized burn unit is given as an example of the quantification of this model. Priority classes can be readily defined by grouping activities showing small differences on the urgency scale. Subjects sorted activities into three classes. (Subjects are not described in this report.) The law of categorical judgment provides a way to estimate priority scale values. Activity of demands for service by patient class is presented according to Connor's patient classification system. Priorities include emergency care, new admission, respiratory care, intravenous procedures, recording vital signs, medication, provision for comfort and safety, etc. These priorities were divided into four priority groupings. "A detailed discussion of the priority-estimating procedure and patient classification scheme is presented elsewhere." (Haussmann, R. K. D., "A Queueing Theory Approach to Measure Quality of Nursing Care: Application in a Burn Unit," Ph.D. dissertation, University of Michigan, 1968. Available from University Microfilms, Ann Arbor, Michigan.)

"To test the validity of the Poisson hypothesis about the arrival process in any priority class, a time-series analysis consisting of three stages is necessary." Periods of being stationary in the arrival process must be determined. The independence of interarrival times must be established. The distributional properties of stationary independent interarrival times must be identified as representing a Poisson process. "These analyses indicate that the arrival patterns of demands of priority levels one and four are Poisson processes, while those of demands of priority levels two and three are semi-Markov processes with strong Poisson characteristics." "Thus, except for the preemptive nature of priority one demands and the non-Poisson arrival processes of demands of priority levels two and three, the empirical model for the burn unit coincides with the theoretical model."

The waiting times so estimated constitute an index of the quality of nursing care and afford a means of predicting changes in quality with changes in staffing or inpatient load.

Findings.—It is apparent that the effect of the nurse's workload on nursing performance is highly significant. For activities of lower priority, waiting time increased disproportionately with increase in load, and priority is also apparent.

Conclusions.—"Increasing the load on the individual nurse, whether by making her responsible for more patients or by increasing the nursing requirements of these patients, will always result in a rapid increase in the waiting times of priority three and priority four activities." The waiting time of patient demands is directly proportional to the condition of the patients to whom a nurse is responsible on her shift. Also, as the load on the nurse decreases, the accompanying decrease in service delay is inversely proportional to the demand priority; that is, the higher the priority the smaller the possible reduction in delay of service These relationships indicate that the major effect of staffing or organizational changes on quality of nursing care will be in the quantity of physical and emotional support the patient receives.

The shortcomings of applying this methodology is that the analytic model relies on the Poisson nature of the arrival process. If this property does not obtain a fair degree of accuracy, then queueing theory is unable to provide an analytic solution to the waiting time problem unless priorities do not play an important role in the service mechanism. The methodology does not present any special difficulty of computation since computer programs are available for most of the statistical analysis performed.

The model facilitates investigation of the relationship among three factors: patient condition, nurses' activity priorities, and patient load per nurse.

Critique

A staffing methodology and its success in predicting the number and kind of staff required to care for patients in a particular nursing unit is tested in the real world. Did the methodology lead to a prediction of staff that provided the quantity and quality of care desired? What was the standard?

The inclusion of the research by Haussmann is a literature review on staffing methodology and is justified because he examined these questions. His report is lucid and well written. Although the model he developed is tested on a unit of high intensity care (the burn unit), the model and Haussmann's ideas merit examination in other units.

The article by Haussmann is derived from his doctoral dissertation, which was not examined. Because of the nature of the publication outlet, details about the research methodology such as data collection, sample size, and reliability and validity of data are missing in this article. The basic document should be read to answer these questions. But in brief capsule, he described the conception of the model, drawing upon the research of Connors and Aydelotte and on studies employing operations research methodology. The description of the queue discipline makes sense and suggests that this be further explored in other nursing settings. Haussmann's simple but practical proposal that one look at the percentage of time used for aspects of care established at the low priority levels (nonlife saving in objective) as a measure of quality has merit. Such an idea is not without problems and fallacies, but it is a new idea, not found elsewhere in the literature.

D23. Howe, Arlene. "Supervisors Coordinate Patient Services." *Modern Hospitals,* Vol. 101, No. 1 (July 1963), 77–81.

Review

At University Hospital, University of Michigan, methods engineering principles have produced a management concept that appears to return the nurse to the bedside.

The problem of returning the nurse to the bedside involves the need to delete from the nursing service department those activities that could be defined as "nonnursing" and the need for coordination of the manifold activities that occur within the nursing unit.

A utilization study is explained by means of a graph that shows the amount of time spent on patient activities. There is no explanation of method involved in utilization study. Findings include that at least 26.7 percent of nursing activities from 8 a.m. to 4 p.m. could be classified as nonnursing. Time spent on "exchange of information" and "other indirect care" totaled another 25.2 percent. The nonnursing distractions totaled an even greater percentage from 4 p.m. to midnight. Only

13 percent of available nursing service time was being contributed by personnel without formal education or training in direct care of patients. "Our initial studies confirmed our belief that nursing had accepted so many nonnursing functions over the years that there was a real potential for the division-of-labor technique."

"From the research we developed a new concept based on a realignment of functions, generally, and the provision of a new system of supervision within the nursing units." A service unit consisted of 100 beds divided into two units of 50 beds in a "double Y" design. The nonnursing supervisor was in charge of the clerks, maids, and porters. Primary responsibilities of the nonnursing supervisor included the following: maintaining a clean environment, errands, patient transportation, and general clerical duties. All telephone calls were answered in the service unit office. The nursing station retained a floor clerk whose duties included transcribing medical and medication orders, checking stock pharmaceuticals, maintaining nursing payroll time records, and other duties assigned by the head nurse.

To achieve the desired organization, six budgeted positions were transferred from nursing service (two clerks, four aides), six and one-half positions were transferred from building service, and two and one-half positions were added.

"Through the application of method analysis based on methods engineering principles, many improvements in the clerk's functions became realities."

A good service supervisor is described as being resourceful, well organized, and conscientious.

A new program is providing an opportunity to create a new image of the head nurse as a planner and expert of patient care. All personnel have been upgraded; that is, each individual is now responsible for a certain area of activity. The program has received the support of the medical staff as well as of all related administration. There were some inevitable increases in costs. The increase in nursing time for patients has not been accurately identified.

(This study makes reference to certain study results and to certain types of analysis, but a description of a study is not included.)

Critique

This article describes "the management concept that appears to return the nurse to the bedside." The article is relevant to nurse staffing methodology. It points out that under this management concept, nursing staff was relieved of nonnursing tasks, which comprised a large proportion of their time. Relieving nurses of these tasks would change the requirements of types and numbers of personnel required for a nursing unit.

The article does not describe the utilization study or the methods used to conduct it. Apparently, an industrial engineering approach was used to obtain the data and findings. The article is brief, clearly written, and informative about the use made of the findings. It does not offer details of an approach, however.

D24. Jacobs, Stanley. "Older Patients Get More Care." *Hospitals, J.A.H.A. (Journal of the American Hospital Association),* Vol. 43, No. 24 (December 16, 1969), 63–73.

Review

Location.—Fifty-four of the Nation's general short-term hospitals.

Purpose.—To gather research data on nursing activities by means of work sampling.

Methodology.—"The background for the study, methodology, and certain statistical considerations is discussed in a previously published article" (Thompson, John D., et al. "Age a Factor in Amount of Nursing Care Given, AHA Study Shows," Hospitals, J.A.H.A., 42:33, March 1, 1968).

Study findings are based on computer analysis. Data used includes 43,213 patient days, 182,799 staff hours, and 234,985 work sampling observations.

Nursing hours include all nursing staff personnel assigned to the units under study and may include student nurses assigned to the unit for training, volunteers and such personnel as military reservists.

Each work sampling observation was classified in one of 16 activity classifications and included under three major headings: direct patient care, indirect patient care, and employee activities. (A listing of the activity categories by major activity classification is presented.)

Analysis of variance statistical tests was applied to data concerning patient's age and nursing hours per patient.

Two separate nursing hours per patient per day were computed. "The difference between Type I and Type II prorations is a function of the mathematical treatment of work sampling observations which were not related to specific patients." One treatment of data tended to minimize difference in nursing hours per patient between age groups and one treatment of data maximized it.

Findings.—The average nursing hours per patient per day drops when nonsalaried personnel are not included. (Standard deviation increases from .70 to .80.)

Comparisons of nursing hours per patient per day were made between: hospitals under and over 300 beds, university-affiliated hospitals and others, hospitals participating in the Hospital Administrative Services program and others, and hospitals with a high degree of effort specialization and those with a low degree. For each comparison the difference in nursing hours per patient day was small and not statistically significant.

A large difference between lowest nursing hours per patient per day (Chicago) and the highest nursing hours per patient per day (Atlanta) is shown. Chicago shows 3.92 nursing hours per patient per day with 51 percent of staff composed of registered nurses and licensed practical nurses. The other end of continuum shows Atlanta with 5.14 nursing hours per patient per day but only 29 percent of staff composed of registered nurses and licensed practical nurses. "There is a limited number of hospitals represented in each region."

A table shows by type of staff and by shift the percent of time spent in direct care, indirect care, and employee activities. There is a slightly larger percentage of time spent in direct patient care on the day shift than on the other shifts. On the night shift, a slightly larger percentage of time was spent in employee activities. Activity patterns of head nurses and ward clerks differ significantly from those of the other types of staff. A more extensive analysis reveals the similarity of activity patterns of various levels of personnel.

The nursing hours per patient per shift and the nursing hours per patient per day increase as age increases, and the rate of this increase accelerates after age 54. For each shift, the analysis of variance statistical tests rejected the hypothesis that there is no difference in care received by age groupings of patients at better than .001 level of confidence. The overall conclusions, depending on the types of proration, are that the nursing hours per patient per day under 65 years of age are increased by from 21 to 31 minutes per day for the age group 65 to 74 and by from 55 to 79 minutes per day for the age group 75 and over.

The average difference in nursing hours per patient per day in medical units was 10 minutes per day less than in the surgical units.

Conclusions.—"The consensus was that the studies adequately substantiated that adult medical/surgical patients age 65 and over receive more nursing care than do other adult medical/surgical patients. Further, the amount of the difference became greater as age increased over 65. It was agreed that no additional studies are required to document this conclusion."

Critique

This is an article prepared for periodical outlet of the AHA sponsored study entitled "Patients Over Sixty-Five Receive More Care, Early Results by AHA Study Indicate." The article summarizes the methodology and the major findings in the research report. It does not go into great detail about either of these, and the individual concerned with nurse staffing methodology will wish to read the full report.

The value of the article lies in its giving an overview of the basic research and making available the major findings to a wide audience. However, it presents data contrasting regional differences without much explanation of the sampling procedure, which could lead to misuse of the information. It does not define the activity categories other than by means of a listing.

The writing of the article is clear and concise.

D25. Jelinek, Richard C. "A New Approach to the Analysis of Nursing Activities." *Hospitals, J.A.H.A. (Journal of the American Hospital Association),* Vol. 40, No. 19 (October 1, 1966), 89–91.

Review

Purpose.—To predict the effect in nursing activities of certain factors through the use of multivariate analysis techniques.

Rationale.—The traditional approach of using work sampling or a continuous time study before and after organizational change does not determine how the change affects various nursing activities.

With a properly designed study and the application of appropriate statistical techniques, it is possible to predict the effect of changes in the organization and operation of the nursing unit on nursing activities under specific conditions and provide information as to how the results will change when certain conditions change.

Differences in the average time devoted by the professional staff to direct patient care on a per patient day basis may vary from 15 minutes to 2 hours on the same unit and more if different units and different hospitals are compared. Factors that cause these differences are size of the nursing staff, organization, policies, number of patients on the unit, type of patients on the unit, physical layout of the unit, and supervisor of the unit.

Procedure.—The effect of specific factors can be determined by collecting data on nursing activities on a day-by-day basis and conditions or factors prevailing each day. Data can be obtained by means of work sampling or continuous time study. The larger the variety of units studied are, the more valuable the results will be. Multivariate statistical techniques are needed to investigate the simultaneous effects of many factors affecting nursing activity. The first step is to construct a mathematical formula. To investigate the time the professional nurse devotes to direct care, the size of the professional staff, size of nonprofessional nursing staff, general condition of patients, and size of nursing unit are determined. The formula is as follows:

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4.$$

Y = hours spent by professional staff for 1 day
X_1 = size of professional staff (in hours per patient day)
X_2 = size of nonprofessional staff (in hours per patient day)
X_3 = general condition of patients (Connor's classification system)
X_4 = size of unit.
a_0, a_1, a_2, a_3, a_4 = the effect that X has on Y.

These estimates are obtained by using multivariate techniques with data collected from a "real world" situation.

This method could be expanded to include several hundred factors that affect nursing activity. The use of an electronic computer is preferable.

This approach was tested in an experiment where the effect on nursing activities was investigated. The patients were characterized by general conditions and length of stay. The type of unit and number of patients on each unit were determined. The staff size and mix (professional, practical, nurse aide, and student) were included. Nursing activities were measured in the time devoted on a per patient day basis to direct care, indirect care, and nonproductive activity.

Findings.—The available staff is an important variable in determining the time devoted to various nursing activities. A small change in this variable results in a large change in the time devoted to nursing activities.

The relationship between available staff and indirect patient care is such that additional increments in staff yield progressively lesser increments in direct patient care. Increments in direct patient care are proportional to the increase in direct patient care for nursing aides only.

Added increments in available staff yield progressively greater increments in nonproductive activity. For nursing aides, the increase in nonproductive activity is proportional to the increase in available staff.

The contribution to direct patient care for each additional unit of staff is greatest for the nursing aide, followed by the practical nurse, the student nurse, and smallest for the professional staff.

The professional staff adjusts their time in direct patient care to the nursing needs of the patient.

New admissions or census variables did not effect nursing activities.

Substitutional effects are as follows: changes in nursing aide staff levels had negligible effect on the direct patient activity of other staffing categories, changes in professional and student staff levels markedly affect the direct patient contact by the aide, increases in other staff levels relieve the time devoted to direct patient contact by the professional nurse, there is a pronounced substitution effect in the time devoted to direct patient care between the professional and student staff.

Implications.—Any number of activities and any number of measurable factors affecting the nursing activities may be investigated. Individual conditions may be considered. There may be no need for hospitals to conduct work sampling studies on their own units since the results may be directly obtained from the proposed nursing model by specifying the prevailing conditions.

Critique

This is the periodical release of a basic study conducted by Jelinek, entitled *Nursing: The Development of an Activity Model* (Ann Arbor, Michigan, Bureau of Hospital Administration, University of Michigan, 1964). The article, as is the basic study, is highly relevant to the subject of nurse staffing. The major findings, many of which are reviewed in the article, have grave implications for nurse staffing.

The article includes a very brief reference to present day approaches to the study of nursing activities. The author presents a logical argument for the development of a productive tool to measure the effect of manipulating variables associated with staffing. In the article, he identifies several factors that he believes operate to affect the activity performed by nursing staffs.

Few data are provided in the article itself to support his findings. Nor does he recognize that some of the same results were obtained in the Iowa Study. The use of multivariate techniques is standard methodology; this he recognizes and provides four known references.

The publication of the article does have merit since his work represents a beginning breakthrough on the development of a productive tool. However, the reader will do well to bear in mind that Jelinek is discussing current practice and a single setting. He does little to draw the attention of the reader to the limitations of the study. Neither does he interpret his findings in the present day setting or in any kind of theoretical framework. Therefore, the article, though meriting publication, could lead to gross misunderstanding of his findings and his intent to begin the development of a productive tool.

D26. Levine, Eugene. "Nurse Staffing in Hospitals." *American Journal of Nursing*, Vol. 61, No. 9 (September 1961), 65–68.

Review

Purpose.—(a) To assess the factors that enable Federal hospitals to operate with half as many personnel per patient as do non-Federal hospitals;

(b) to determine if Federal hospitals provide less adequate services than non-Federal hospitals because of lower staffing; and

(c) to determine to what extent lower staffing in Federal hospitals is indicative of greater administrative efficiency.

Premises.—It is the investigator's assumption that answers to the stated problems should provide information in regard to (a) the problem of establishing appropriate relationships between levels of nurse staffing and patient welfare; and (b) if administrative efficiency does contribute to lower staffing in Federal hospitals, it would provide guidelines for more effective staffing of departments. It would also provide information to measure more accurately the extent of the nurse shortage.

In reviewing staffing research previously done, the investigator found that a limited number of possible factors affecting nurse staffing had been investigated, and that divergent conclusions were found in the studies.

Methodology.—The author attempted to design a study that would measure the effect of administrative efficiency on staffing and "examine the impact of nurse staffing of some other factors not considered by earlier studies."

From a review of staffing in 5,300 general and allied special hospitals, a ratio of 53.5 nursing personnel per 100 patients was found in the 400 Federal hospitals studied as compared to 110.5 nursing personnel per 100 patients in non-Federal hospitals.

Sample.—One Federal and two non-Federal hospitals were studied. They were matched as to size between 210 and 250 beds. Schools of professional nursing were not associated with these hospitals. The USPHS Hospital at Boston, Massachusetts, and two voluntary community hospitals in the suburbs of a large metropolitan area comprised the samples. The Federal hospital employed 49.9 nursing personnel per 100 patients. The non-Federal hospitals employed 113 and 125 personnel per 100 patients.

Method and instrument.—A framework was developed for determining major factors that might affect nurse staffing and those factors that could be measured quantitatively.

The five broad factors considered were (a) patients receiving services, (b) personnel providing services, (c) adequacy of services being provided, (d) organization in which services are provided, and (e) efficiency of organization.

A classification method developed at Johns Hopkins Hospital was applied to a "sample" of patients in the hospitals studied. The patients were placed into one of three categories according to the type and extent of care required: intensive care, intermediate care, or minimal care. From the number of patients in each of the categories it was possible to evaluate the comparative workloads of the hospitals.

An intensive analysis was made of personnel turnover. The author explains that a new employee is only about 80 percent as productive as a more experienced employee, and a considerable amount of the employee's time and of administrative time is involved in hiring, training, and supervising.

Adequacy of service in the three hospitals was measured by a methodology developed by the Division of Nursing, USPHS. Checklists were filled out by a sample of patients and personnel. The checklist contained 50 items that describe incidents in which specific needs for nursing services are not filled. The number and importance of the items checked provide the score.

The physical layout, organizational structure, and types of services provided were studied by use of existing records, direct observation, and questionnaires.

Efficiency was defined as those practices, policies, and procedures that enable a hospital to provide nursing services that are as adequate as those of another hospital with fewer personnel per patient, such that they can feasibly be adopted by the other hospitals.

Results.—Data were collected during the fall of 1959. It was determined that 20 percent of differences in staffing was attributed to the fact that the patients in Federal hospitals were less acutely ill than in non-Federal hospitals. Another 20 percent was attributed to a greater number of omissions in nursing services to the patients. Another 22 percent was due to organizational characteristics of the Federal hospitals that could not feasibly be adopted by non-Federal hospitals. Thirty percent of the difference was considered to be the administrative efficiency in Federal hospitals: • use of larger more homogeneous bedside nursing units, • use of flexible personnel assignments to match patient requirements, • establishment of practices that relieved nursing personnel of nonnursing responsibilities, • employment of well prepared personnel, • maintenance of an attractive personnel system to promote stability of staff, • documentation of objectives, policies, procedures, and accomplishments for continual coordination and continuity of operation, • use of structured channels of communication, • encouragement of staff to participate in the administrative process, • participation of nursing department in the process of budgeting, and • use of a continuous system of reappraisal to improve utilization of personnel.

Conclusions.—It was stated that the sample in this study was too small to permit generalizations. The conclusions that may be drawn from the study are that more effective use of nursing personnel skills in hospitals could be increased to close the gap between nursing needs and supply, and that nursing service administration plays a vital part in the hospital's requirements for personnel.

Critique

Continued efforts to determine hospital staffing needs led this investigator to determine why Federal hospitals can operate with half the number of personnel that were found in non-Federal hospitals and specifically to determine whether or not less adequate services are provided in Federal hospitals and to what extent lesser staffing in Federal hospitals can be attributed to greater administrative efficiency. This is a relevant investigation. The rationale is sound.

The survey method was employed; it is briefly described. Five broad factors were considered: • patients receiving service, • personnel providing service, • adequacy of services being provided, • organization in which services were being provided, and • efficiency of organization.

The Johns Hopkins method was applied in categorizing patients according to type and extent of care required: • intensive care, • intermediate care, and • minimal care. Adequacy of service was measured by a methodology developed by the Division of Nursing, USPHS. Personnel turnover, organizational structure, and types of services provided were studied.

The sample is small and the many deficiencies in the reporting of the study make it impossible to evaluate its research quality. Uses of the tools are briefly described; tool samples are not included. It makes no apparent contribution to nurse staffing research design. It is an interesting study, but a much larger study sample would be required if conclusive results are to be obtained.

The reader is referred to the article and critique of Levine's doctoral dissertation upon which this article is based.

D27. Levine, Eugene. "Some Answers to the 'Nurse Shortage.'" *Nursing Outlook*, Vol. 12, No. 3, (March 1964), 30–34.

Review

Purpose.—This article is a review of studies and their findings, justifying the author's opinion that measuring the nursing hours alone will not assure increases in adequacy of patient welfare. The article is based on a paper presented at the annual convention of the New England Hospital Assembly, Boston, Massachusetts, March 1962.

It is stated that the Surgeon General's Consultant Group on Nursing estimated that 558,000 professional nurses and 600,000 practical nurses and nurse aides would be needed in hospitals by 1970. Studies by this group show that training of this number of personnel is not possible due to lack of facilities, of teaching personnel, and of qualified applicants.

Suggested means for overcoming the deficiency are (a) recruitment of inactive nurses to reenter the labor force. While these nurses increased from 20,000 in 1950 to 80,000 in 1962, it was felt that this supply would diminish considerably in the next 10 years, and (b) improved utilization of nursing personnel was presented as a better solution to the deficiency. Management tools used in industry such as work sampling, simplification, standards, and many others may be used for improved utilization. Work sampling studies in hospitals have shown that utilization of nursing personnel is not as productive as it could be because the hospitals base staffing on gross standards without questioning whether this "standard" really applies to their own situation.

The author states that research has shown evidence that numerical ratios, such as hours of nursing care per patient, do not provide a satisfactory standard as a guide to staffing and utilization. There is no way to demonstrate that the amount of nursing care available is directly related to patient welfare. Hospitals vary widely in the daily hours of nursing care available, and studies show that hospitals do not always make productive use of their personnel. There is contradictory evidence concerning the relationship between hours of nursing care available and patient welfare. Abdellah and Levine, in their studies, found a strong relationship of numbers of nursing personnel to patient satisfaction, but New and Aydelotte, in separate studies, found that an increase in hours available does not necessarily increase patient welfare.

In a utilization study (study not identified) in the three hospitals studied, where one and a half as much nursing care per patient was given as the amount given in the other two, differences were related to patient requirements, physical layout, medical staff organization, and adequacy of service provided. Thirty percent was attributable to practices and procedures that led to more effective utilization of personnel in the hospital with the smaller staff.

In the AHA survey of hospitals in the United States in 1957, there was great variation in the ratio of nurses to patients among 5,000 general hospitals. The methodology of tabulating and analyzing the data is shown in the May 1957 issue of *Hospitals*. Staffing was analyzed in terms of average daily hours of nursing care available per patient rather than ratio. In 1959, the basic data were again analyzed and the analysis was updated by 2 years.

Nurse staffing was studied by size in general and allied special hospitals. A chart is included in the article. Data collected from 4,859 hospitals show that an average of 4.69 hours of bedside care per patient per day existed in 1957. Only 1.27 hours were provided by professional nurses. Nursing students were not included in the study. An inverse relationship between size of hospital and amount of nursing care available was found. Variations in hours of nursing care per patient were so large it appeared that no two hospitals have the same staffing patterns.

Hours of nursing care per patient by State were studied and showed great diversity from State to State. New England, Mid-Atlantic, and Pacific States had the highest number of professional nursing care hours. South Central States had the lowest hours of care per patient but the highest hours of practical nurse and nurse aide care. The major factors that appeared to influence staffing patterns are as follows: • the fluctuations in patient requirements for service (fluctuations in patient census are usually much greater in small hospitals than in larger ones); • the range of services assigned to nursing personnel was found to affect numbers required (in smaller hospitals nurses are assigned more duties that are not nursing responsibilities); • the organization of services and physical settings were found to affect the amount of nursing staff required (larger units required less personnel); • the availability of nursing staff (where output of schools was greater and salaries higher, more professional nurses were found); and • the utilization of personnel (where smaller numbers are found on the staff it is suggested that staff is being better utilized). It is suggested that many other factors also exert important influences on staffing patterns, such as budget, hospital's ability to attract personnel, prestige of hospital, and medical and nursing staff relationship.

Summary.—The article states that the data presented have shown that "meeting the needs for hospital nursing personnel cannot be governed by quantitative considerations alone." Less than one-third of the total nursing hours available are provided by professional nurses and nearly one-half by "on-the-job trained" nurse aides, fewer than one-half of professional nursing care that was recommended by the Hospital Nursing Service Manual [1] 13 years before.

Increase in hours of care available will not improve adequacy of patient welfare unless qualitative aspects of nurse staffing are stressed. Among the qualitative aspects are improved levels of competence, skills of the staff, and the degree to which the skills are utilized.

Critique

This article is not the report of a research study but is written by the author to justify his opinion that measuring nursing hours alone will not assure increases in adequacy of patient welfare. The article is based on a paper presented at the annual convention of the New England Hospital Assembly, Boston, Massachusetts, March 1962. The nurse shortage is discussed and solutions to the problems are outlined. In his discussion, Levine identified one of the major problems in staff utilization as the numerical ratio used in the assignment of staff, stating that it does not provide a satisfactory standard. Supporting his opinion through the literature review, Levine discussed the many factors underlying staffing requirements. He presented the great diversities that exist in quantity ad quality of staffing according to hospital sizes and geographic location.

Levine justifies the need for a method of assessing staffing needs and staffing patterns, one that will consider all of the factors influencing staffing needs and will ultimately result in improved patient welfare. His attempts to assess patient welfare in relation to staffing requirements are contradictory, and quality of care per se is not discussed.

It has long been recognized that staffing assignment methods are deficient and will probably remain so until improved methods for assessing quality of nursing care are devised. However, due consideration given to the factors influencing staffing needs has enabled us to adjust staffing assignments for specific need situations and has encouraged better utilization of existing personnel. This article should be of interest to persons involved in the assignment of nursing staff.

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[1] AHA and National League of Nursing Education. *Hospital Nursing Service Manual.* New York, National League of Nursing Education, 1950.

D28. Levine, Eugene; Siegel, Stanley; and DeLa Puente, Joseph. "Diversity of Nurse Staffing Among General Hospitals." ***Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 35, No. 9 (May 1, 1961), 42–48.**

Review

Purpose.—To present data on the actual ratios of nurses to patients in short-term general and allied special hospitals in the United States.

This study was presented to determine what standards can be used to assure sufficient yet economical nurse staffing. The authors state that more staffing requirements are based primarily on patient census without consideration of other factors that could influence those requirements. Staffing requirements are generally expressed as ratios of numbers of nurses required in relation to numbers of patients. Other factors influencing staffing that are not considered in ratios are organization and management of the hospital, physical layout, kinds of patients it serves, training, skills, and productivity of its personnel, availability of financial resources, and labor supply.

The importance of this study is justified by the author in that hospitals employed 325,000 of the 504,000 professional nurses active in 1960. In addition, 500,000 auxiliary personnel are employed in hospitals and the number is increasing each year.

Methodology.—The data were obtained from the 12th annual hospital survey conducted by the AHA in 1957. Six ratios were computed for each of the 5,399 short-term general and allied special hospitals. These include short-term, Federal and non-Federal hospitals in the following service categories: general; maternity; eye, ear, nose, and throat; children's and orthopedic hospitals.

The six ratios (table 1) are used to describe staffing patterns in hospitals. Ratio titles are (1) total bedside nursing personnel per average daily census per 100 patients, (2) staff nurses per 100 average daily census, (3) practical nurses per 100 average daily census, (4) auxiliary nursing personnel per 100 average daily census, (5) staff nurses per 100 total bedside nursing personnel, and (6) supervisors per 100 total bedside nursing personnel.

Ratios 1 through 4, defined by the investigators, show relationships between numbers of bedside nursing personnel and numbers of patients. They include only nursing personnel involved in direct nursing care in the patient care units. Administrative, supervisory, control, supply, and operating room positions were excluded. These ratios were computed to determine how much care was provided from the different categories of personnel. Ratio 5 shows proportion of professional nurses to total bedside personnel and the proportion of care given by professional nurses. Ratio 6 shows the relationship between the number of administrative and supervisory personnel and total bedside nursing personnel.

As a basis for comparing staffing, hospitals were grouped according to average daily patient census, control, State, region of location, and population of the city where they were located. For each of the six ratios, an average ratio (unweighted arithmetic means) for hospitals in the same group was computed by adding the ratio for each hospital in a group and dividing by the number of hospitals. Unweighted average ratios were selected "after an evaluation of the conceptual strengths and weaknesses," and two were determined. Weighted average ratios can be computed for some hospital groups from the tables on nursing personnel in the Guide Issue of *Hospitals, J.A.H.A.;* e.g., unweighted ratios cannot be obtained from the guide. Values of the two types of ratios "vary somewhat."

Coefficient of variation—called "index of diversity" is reported in addition to the average ratios. These are measures of the variation of ratios among the hospitals. (Computation method is described in the article.) The advantage of using this method rather than standard deviation is that it adjusts the standard deviation for the bias that would otherwise be present because larger hospitals with larger nursing staffs have a greater range in which to vary. Index of diversity is interpreted as follows: If the ratio for each hospital in a group were the same, the average ratio would be identical to each hospital's ratio. Then the value of the standard deviation and the index of diversity would be zero. The higher the index of diversity is, the less the uniformity of staffing ratios among hospitals is.

Average ratios and diversity indices for the six nurse staffing ratios were classified by average daily census, by control, by geographic location, and by population of the area of location of the 5,399 hospitals. Computations were processed by Dr. Nathan Jaspen, Ph.D., on the electronic computer of the NLN. Only a small portion of the data is shown in this report.

Findings.—In the analysis of nursing staff ratios for all 5,399 hospitals, it is found that there was an average of 89.0 total bedside nursing personnel for each 100 patients. Percentage distribution according to job category is: professional staff nurses 27.9, practical nurses 24.6, nurse aides and orderlies 47.5. There was more uniformity among hospitals in total size of nursing staff than in specific composition of the staff.

The ratio showing greatest diversity among specific categories of bedside personnel is the practical nurse with an index of diversity of 124 percent. Least diversity is found in the nurse aide ratio. Ratios of total bedside nursing personnel to patients (ratio 1) show there is more uniformity among hospitals as to size of nursing staff than uniformity of specific composition of the staff.

It was found that as the size of the hospital increases, the staffing ratios decrease. Greatest variability was found in small (daily average census of 25 patients or less—ratio 100.5) or very large hospitals (daily average census of 1,000 or more—ratio, 47.9).

As the percentage of professional bedside nursing staffing increases, the ratio of administrative and supervisory personnel to patients was found to decrease. Supervisory ratio for 300–399 size group is 13.2 and has the highest professional staff nurse ratio, 34.3. Group size 1,000 has the highest supervisory ratio, 29.7. The author feels that these findings may indicate that more supervision is needed when a larger proportion of bedside nursing staff consists of nonprofessional personnel. Greatest index of diversity of staffing ratio is generally found among the smallest and largest hospitals. Least diversity is found in hospitals with average daily patient census between 100–500 patients. The author feels this indicates that other factors that could influence nurse staffing, such as physical facilities, organizational structure, budget, etc., may be more variable in the smallest and largest hospitals than in the middle-sized hospitals.

Proprietary hospitals were found to have the highest ratio of bedside personnel to patients. Lowest ratio was found in Federal hospitals. It was pointed out that voluntary hospitals, more than other hospitals, augment their paid nursing staff by using students and volunteers, making the ratios considerably higher. Because of the five Federal hospital systems there are great variations in size of hospitals within the system, and the hospitals are more likely to have different nurse-patient ratios.

As population of the area in which a hospital is situated increases, the ratio of total bedside nursing personnel to patients was found to decrease. These data reflect the fact that in less populated areas there are more small hospitals having higher nurse-patient ratios.

Hospitals are grouped into four geographic regions for study. Bedside nursing ratios were found to be highest in the West and lowest in the Northeast. However, the Northwest has the highest ratio of professional staff nurses to patients. The Southern region has the lowest ratio of professional staff nurses to patients and the raio of practical nurses to patients is highest in the South. More detailed information is shown in table 6.

The data presented show great dissimilarity among general hospitals in their nurse-patient ratios. In hospitals grouped according to certain characteristics such as size, large differences are seen in average ratios for various groups. There is much diversity between average ratio and ratios of individual hospitals. It is recommended that the reasons for this diversity be answered by further extensive research.

Critique

A survey of existing staffing ratios can provide additional knowledge in the search to determine adequate staffing. Staffing requirements are primarily based on patient census without consideration of other factors central to the brief theoretical framework presented in this article.

The sample and the statistical analysis of data are appropriate and the conclusions are based on the data collected. Because this survey is primarily descriptive, it does not shed new light on the staffing problems. Rather it supports the assumption that there are variables in addition to census that seem to affect staffing ratios.

D29. Ludwig, D. J., and Humphrey, Anna. "Staffing by Nursing Hours Per Patient Day." *Hospital Topics*, Vol. 41, No. 9 (September 1963), 46–48.

Review

The approach to staffing problems was by Contra Costa Medical Service—calculating nursing hours per patient day. Nursing hours per day are a guide in maintaining and controlling nurse staffing without losing sight of nursing quality. Nursing hours per patient day are calculated monthly, quarterly, and annually for analysis.

Nurse staffing control helped reduce inpatient costs by six-tenths of 1 percent at a time when there was a 5 percent increase in salary and 20 percent increase in patient admissions.

The first attempt was to staff at a minimal patient census level. A ward with 48 beds and an average census of 40 patients was staffed at a 33 patient load. Difficulties included constant use of temporary and extra personnel, resulting in chaos.

To establish a census limit within which no additional staff would be added, statistical studies of each ward area were done to establish a mean average census for the year, calculating a standard deviation from the mean.

With the agreement of each supervising nurse, the normal range within which a permanent staff could function without additional help was established. Nursing administration could remove help if the census decreased below the range. However, extra help could be obtained on the basis of need as expressed in a written justification. Thus, nurse staffing agreements did not result in any real controls.

It was then decided that the only way nursing administration could maintain adequate controls was to calculate the nursing hours per day. The supervising nurse establishes the number of people she feels are needed to do an adequate job. The nursing hours are calculated and daily staffing is devised. The supervisors reviewed these agreements with the hospital and nursing administration.

The limits set by the supervisor have always been well within the budget, and additional patient load is absorbed. The overall cost per patient day has been reduced. Regarding the question of quality, the author suggests that quality must be each supervising nurse's determination based on overall acceptable standards.

A copy of the staffing agreement is included in this article.

Critique

This article is relevant to the study of nurse staffing requirements. While most research efforts are directed toward new, improved methods for assessment of nurse staffing needs in an effort to improve utilization of nursing personnel and reduce hospital costs, Ludwig and Humphrey relate their experiences and investigative results to the ultimate endorsement of an older method, staffing by nursing hours per patient day. This is not a report of a research study *per se* but a written summary of the experiences that one hospital encountered in its efforts to improve staff utilization. It seems that the hospital administration's approach was the trial and error method. Finding an excess of personnel on the wards, they chose to understaff and supplement the staff—this failed. They resorted to what they refer to as a normal staff level and found that staff was being wasted. They then resorted to staffing by hours of patient care per patient day. This figure was determined by the supervisor on the clinical service. They contended that quality of patient care is handled through the judgment of the supervisor estimating the care needs and all others aspects of nursing care requirements.

Judgments in regard to the selection of this method of nurse staffing are based on unscientific principles, and its workability would depend entirely on the abilities, judgment, and integrity of the supervisors involved. It is an interesting article for administrators to read but judgments are made without scientific bases.

D30. McCartney, Richard A.; McKee, Barbara; and Cady, Lee D. "Nurse Staffing Systems." *Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 44, No. 22 (November 16, 1970), 102–105.

Review

Purpose.—To develop a nurse staffing system at Hollywood Presbyterian Hospital by a project team consisting of the hospital management systems analyst, an administrative assistant from the nursing office, and a representative from CASH.

Assumptions.—(a) "The total amount of nursing care required over a defined period by the hospital's average patient load can be determined accurately by industrial engineering methodologies.

(b) "This overall standard can be used on a daily basis for allocating staff hours, allowing for necessary variations in patient care time as determined by nursing personnel through direct observation of their patients."

Instruments.—*Performance Standard.* "The average nursing care requirement for medical-surgical patients at Hollywood Presbyterian Hospital, as determined by the CASH study and including necessary modifications, was 4.5 hours per patient day." This report states that when a nursing procedure at this hospital varied from the methodology in CASH's Standard Procedural Manual and the time required for its performance was affected, it was necessary to carry out an independent study. The nursing staff was informed of the reasons for the project prior to CASH participation. Registered nurses, licensed practical nurses, nursing assistants,, and orderlies recorded the frequencies of the procedures they carried out. Special time studies were performed under the immediate supervision of the nursing administrative assistant. "The success of this open approach was affirmed when data collected on a sampling basis and validated by the management systems analyst agreed very closely with the raw figures provided by the nursing staff." In this hospital, 51 percent of the workload was performed on the day shift, 34 percent on the evening shift, and 15 percent on the night shift.

Patient Care Categories. Four patient care categories based on patient behavior observable by nurses were established to determine nursing care requirements. Behaviors typical of each category are described. Examples of these behaviors are indicated in the description of the following categories. Category One includes patients requiring minimal nursing care whose condition is characterized by: mild symptoms, acceptable behavior patterns, need for little or no restriction of activities, need for simple treatments and few medications, need for followup instructions and supervision, and practice in self-care measures in preparation for discharge. A Category Three patient requires considerable direct care of a lesser concentration whose condition is characterized by: acute symptoms that may be subsiding or impending; symptoms of a chronic condition that makes the patient almost completely dependent on nursing personnel for activities of daily living; significant deviation from normal behavior pattern; need for general control of activities; and need for frequent treatment, observation, and/or instructions. "The ratios established to allow for variance in time it takes to provide appropriate care for patients, computed to a known average or baseline were: Category One: .65, Category Two: 1.00, Category Three: 1.35, Category Four: 2.00." The author states that it is important that a hospital determine its own ratios, based on objective study modified by declared policy.

Procedure.—The basic 4.5 hours per patient day were allocated among 12 components based upon four categories of patient care requirements and on all three shifts. "A sample of 100 patients was distributed into these categories and the subsystem was tested and validated." The records are reviewed to see that the patients remain distributed in constant proportion among the four categories. The total nursing hours required were prorated according to shift and to category of patient. "Forms were constructed and procedures developed for gathering data from each nursing unit on each shift to permit estimates by category of the numbers of patients to be cared for by the oncoming shift." Staffing tables were constructed to permit easy calculation of required nursing hours.

A description of actual implementation follows. The head nurses complete their classification survey, which includes the projection for the next shift. The supervisor validates any unusual number of patients in any category. The administrative supervisor utilizes staffing tables to calculate the nursing hours and enters the nursing hours required and the number of hours scheduled for full-time permanent nursing personnel. At Hollywood Presbyterian Hospital, the typical permanent day tour staff on a unit includes a head nurse, two registered nurses, a licensed practical nurse, a medication nurse, and a ward secretary. The permanent staff generally is held to a number sufficient to serve 80 percent occupancy rate. The total number of hours is divided by eight to obtain the number of nurses required.

The staffing formula is: $h = \Sigma\Sigma[R(J) \cdot N(J) \cdot H(I)]/(n)$. Double summation ($\Sigma\Sigma$) is over all four categories of patients throughout three shifts.

h = average number of nursing care hours as determined by CASH.

$R(J)$ = proportion of time required to care for patients in each category (direct measurement).

$N(J)$ = number of patients in J care category.

J = patient Categories One, Two, Three, and Four.

$H(I) = S(I)/r$, the number of nursing hours required for Duty Shift I.

I = day, evening, and night shifts.

$S(I) = h \cdot F(I)$, the share of nursing hours required on Shift I to care for an average patient.

$r = P(J) \cdot R(J)$ where the summation is over all categories.

$P(J)$ = the percentage of patients that are usually in each care category.

n = the number of patients in all categories.

Critique

This study is relevant to the problem of nurse staffing requirements and is based on the effective use of nursing resources and the assessment of nursing workload. The study is briefly reported, thereby limiting the assessment possibilities.

The purpose of the study was to establish, through the use of industrial engineering methodologies, improved systems for providing the required nursing staff for appropriate care of the hospital's total patient load. The assumption that accurate determination of patient load can be assessed by industrial engineering methodologies is a misconception. Nursing care quality must be considered; merely determining levels of care required by patients is not sufficient.

Four patient care categories are defined by nursing personnel according to the degree of illness of the patients and their care requirements. This is briefly described. Methods are not described in assigning standard times to procedures. This was based on the CASH method. Pertinent variables are not defined. Frequency of procedures performed are recorded by participant recorders, and time studies are recorded by an observer recorder on a sampling basis. Forms for data collection are not included. Nursing care quality is not assessed but is left to the judgment of the nurse involved. Staffing formulas and tables were established based on total nursing time required per patient day (4.5 hours). This time was prorated by shift. A formula is provided for computing the daily staffing needs for each shift by assessment of individual patient needs.

The method presented in this article appears to be an improvement over some earlier methods applied in the assessment of nurse staffing needs. Needs are in some degree related to the individual patients, but lack of information in regard to assessment techniques and tools makes it impossible to determine this. This article should prove interesting for administrators and research persons concerned with nursing staff requirements but its use should be carefully examined.

D31. Moran, Sister Ann. "Staffing an O.R. Unit." ***American Operating Room Nurses' Journal*, Vol. 9, No. 3 (March 1969), 76–83.**

Review

This article is a discussion of the functioning of a staff in the operating room unit as perceived by the author, who assumed the position of supervisor in the operating room unit. The group consists of experienced, competent operating room nurses who function as team members and occasionally as head nurses in surgery. The supervisor's subroles are role model, participant observer, informal teacher, investigator, and influencer.

Permissive leadership and willingness to venture were attributes reflected by the author. Concepts of cooperation, interpersonal relationships, and group process were influenced.

Norms that had developed in this group were evident. The "rotating charge nurse" norm had developed because the head nurse resigned. Several group members had the necessary qualifications but preferred to remain team members. Several years have elapsed since the group members agreed to assume the role of charge nurse 1 day a week. The plan filled the need of leadership status for each group member without draining the potential of one person.

Group centered groups may be more effective in inducing conformity. Since the operating room situation is highly organized, it is recognized that lack of conformity reduces productivity of team and affects patient care. There is a desire for acceptance and status mobliity.

Six points are mentioned in assessing the group's effectiveness. Group values and norms similarly indicate effectiveness since they have been agreed upon through consensus. Team communication is a reality; information is open. Only one new member has been incorporated in the original group indicating group duration. Three other points are the ability to accomplish objectives, contribution of role differentiation, and membership aspects.

Factors affecting staffing in the operating room are generally discussed. The criteria for structuring a staffing pattern in the operating room should include the average daily person and the consideration of frequency of common types of operating procedures. The surgical suite consists of eight units of the same size in which any procedure may be performed and a cystoscopy room. There are a large number of nurse practitioners in this metropolitan area. The turnover in the operating room is relatively low. The personnel policies affecting staffing are a 40-hour week, holiday, sick leave, and vacation benefits. Part-time policies, rotation, weekends, and on-call duties are described. Job descriptions for graduate nurses, operating room technicians, nursing assistants, and clerical personnel are based on standards set by the Joint Commission for the Accreditation of Hospitals. Three categories of personnel are needed. The number of pesronnel required is taken from the Hospital Nursing Service Manual. A chart shows the number and level of personnel needed.

The author suggests inadequacies of the proposed staffing plan. More professional nurses are needed while the elective schedule of surgery is in process. The operating room as a specialty unit cannot rely on help from other units and must compute its own sick leave and vacation time. The on-call time does not come within the regulations of the Fair Standards Act.

Critique

This article is a testimonial of the successful working of an operating room nurse force. It does not entail any aspects of a study. There is no documentation of the success of the plan other than the lack of turnover. It does not relate, for example, features of staffing to infection rate, accident rate, etc.

D32. Morrish, Arthur R., and O'Connor, Anna R. "Nursing Service-Cyclic Scheduling." *Hospitals, J.A.H.A. (Journal of the American Hospital Association)*, Vol. 44, No. 4 (February 16, 1970), 66–71.

Review

Purpose.—This article describes a computerized cyclic scheduling program that was developed over a 5-year period at Harper Hospital, Detroit, Michigan. A 700 bed medical and surgical teching hospital has a nursing service of more than 500 nursing service personnel in 20 units.

Methodology.—A centralized time planning method (description included) was implemented in 1963 to free head nurses for other responsibilities. It proved to have many advantages: • scheduling could be accomplished by one or two people; • employees were distributed more evenly; • employees received equal numbers of weekends off and did not work more than 6 consecutive days; and • rotation evening and night shifts were equal. The large amount of detail involved, they felt, could be better handled by a computer. A research programer, a nurse supervisor, and the hospitals data processing manager designed a cycle 7-week, days-off pattern with a pool system of float personnel. The programer observed the patient units to determine how scheduling affected employees, patient units, and patient care before the pattern was initiated. The following basic staffing policies were agreed upon: • auxiliary nursing personnel and ward clerks would rotate shifts; • options available to full-time employees were permanent evening or night shifts, rotation days to afternoons or midnight shift; • a maximum of 40 hours per week would be scheduled; • an employee could not be scheduled to more than 6 consecutive days; • personnel rotating from the midnight shift would have a day off before returning to days; and • employees rotating on evenings and nights would be assigned back to days in the succeeding period. To aid in acceptance of the program, head nurses were involved in each step of the program and all personnel attended conferences where the program was explained by nursing service administrative personnel.

After a trial period of 1 year, employees wrote an evaluation of the system. In light of the objections received, in addition to administrative opinions, a 12-week cycle time plan was designed. Time plans involved 12 weeks with the following variables: • length of weekends (2, 3, or 4 days); • frequency of 3- and 4-day weekends; • number of single days off; and • number of 6-day work periods. Twelve-week periods were chosen because they adapted informally to large and small units and were divisable by two, three, four, and six.

The above plan existed at the time the article was written. It covered a 12-week period. Each nurse had 4 weekends off, two of which were 3-day weekends, 6 single days off, and 5 workweeks of 6 days each. The 12-week pattern was repeated for every 12 employees beginning at a different week in each pattern. Minimum staffing patterns were reviewed and a priority assigned to each unit for each shift. Limits were set on the category and total number of employees that could be rotated from each unit. In assignment of the days-off pattern for each employee, an effort was made to assign rotating employees to the same unit regardless of shift.

Operation of the system.—Each employee was assigned to a home unit where he worked when not rotated. Float was treated as a home unit. Every 4 weeks (2 weeks before the effective date of change) the rotation program was run to assign every employee to a particular patient care unit for 4 weeks. Days off were determined by the day-off pattern assigned to the employee. Personnel were assigned in the following order: (a) permanent afternoon and night employees; (b) personnel just off rotation to day shift; (c) registered nurses available for rotation (these were assigned to each unit in priority order); (d) practical nurses qualified to give medications (these were also assigned according to unit priority); and (e) practical nurses, aides, floor clerks, and orderlies were assigned. If it was necessary to understaff any shift it was always the day shift. Each time an assignment was made the computer recorded the day-off pattern, the shift, and the category of employee assigned to each unit and kept a record of each employee's rotation.

Illustrations and descriptions of "printouts" are included. These provide complete staffing information for both head nurse and employee. One printout allowed the head nurse to make week to week staffing changes. Great emphasis was placed on the amount of time saved by the method, stating that the major portion of the scheduling is done by two full-time employees, a time planning coordinator, and a clerk. It was determined that 15 hours were spent in keypunch clerical time and 7 hours in computer time per month.

Conclusions.—Problems with the program are enumerated as: (a) the program was too complex, errors were made unless the programer was very familiar with the progress; (b) it was difficult to "debug" new or changed programs, the computer error or input error was undetected, and the unfinished product caused some loss of confidence; and (c) some people develop an unwarranted faith in the computer's performance. It is pointed out that the principles of the program do not necessitate the use of a computer nor would the computer have to be "on premise" if used.

The authors state that the frequent evaluations of the program indicate that "the advantages of the program definitely outweigh the disadvantages." They also believe that the cost of 60 cents per bed per month is less expensive than clerical costs would be for an all-manual system.

Critique

This article describes a computerized cyclic scheduling program that was developed over a 5-year period at Harper Hospital, Detroit, Michigan. It is a vignette of the experience of the Department of Nursing as it evolved the program.

The article is direct, written in simple style, and includes examples of printouts. It does not present the documentation upon which the staffing patterns for the nursing units is based. Consequently, this article's usefulness is limited to planning and maintaining a schedule after the numbers of nursing staff are determined.

D33. Nadler, Gerald, and Sahney, Vinod. "A Descriptive Model of Nursing Care." *American Journal of Nursing*, Vol. 69, No. 2 (February 1969), 336–341.

Review

Purpose.—To identify all factors that affect the quality of patient care.

Background.—An interdisciplinary group coordinated by industrial engineers at the University of Wisconsin Hospitals was seeking a method of measuring quality of nursing service. Their aims were: (a) to identify the factors that affect quality of patient care, (b) to develop a slide on which to measure them, and (c) to develop a mathematical model that interrelates all factors into a whole measure of quality. This article describes their approach to identifying factors.

Premises.—It is the investigator's contention that previous attempts to measure quality of patient care have been deficient because (a) the research projects do not involve enough factors to cover adequately the range of nursing service, and (b) in most studies, investigators select factors based on convenience of measure rather than on conclusive pertinence to quality of care.

Methodology.—A "system programed" is defined as the specific descriptive model used to identify all of the factors that affect quality of patient care. At the top of the pyramid is patient care. This is subdivided into inpatient care and outpatient care. Inpatient care is subdivided into "diagnosis," "treatment," and "administration." Diagnosis is subdivided into "laboratory services," "radiology services," and "social services." Each of these factors is subdivided: "nursing services" are subdivided into technical factors, personnel factors, and management factors. Subdivisions were made by asking the question, "What are the specific factors within this factor that contribute to the quality of patient care?" The subdivisions are continued to include all factors that influence the quality of patient care. (The models showing factors of patient care and quality of nursing service are included in the study.) The authors cite the study of the Wisconsin Regional Medical Program for heart, stroke, cancer, and related diseases, where the system pyramid showed effectiveness in identification of all factors.

An interdisciplinary committee from the University Hospitals involved professional persons in the development of the model. Additional personnel from nursing service were added when they were specifically discussing the nursing service model.

The investigators make no claims for accuracy or completeness of any part or all of the models at any time, nor do they assume that factors at level "n" will appear in someone else's model as the same level "n." The important criterion is to be certain that all factors appear in the model. Two different ways of constructing the model were being considered by the investigators:

- Jelinek's approach, subdividing nursing care units into the next level of satisfying physician's orders, "Clinical care under nurse's discretion" and "psychologic care"; and
- A method that focuses on factors, when measured, will determine how well the needs of patient care are met. "Nursing Service diagnosis" is subdivided into the next level of "agreement of patients to be assisted, securing and selection of data, state and availability of art and science, and state of proficiency of the practitioner." It is stated that "either method would most likely contain all factors presented in the model."

Summary.—The author feels that the model presented in this article provides an excellent framework on which to develop factor measurements for assessing quality. It can contain all factors at one level or another. The pyramid approach encourages investigators to expand their thinking to make sure that they now or eventually will include all factors.

The qualitative model is useful in many ways:
• The entire model provides a sentence description of specific factors pertaining to quality of patient care. These sentences will specify factors that must be measured to arrive at a final measure of quality.
• A rating scale of zero to 100 can be used to determine a specific degree of quality for that factor, nursing personnel fixing the numbers to the different degrees of quality. • Nursing service administration can use it for planning and control. • Nursing educators can identify for what functions they should prepare nurses, in light of results sought.
• Research designers can make certain that they consider all interrelated factors.

The development of a descriptive model is the first step toward developing the final measure of quality.

Critique

One of the most complicated and confounding areas for study in nursing is the assessment of nursing care quality. Though innumerable research attempts have been directed in this area, never has a completely acceptable method been devised. The assessment of nursing care quality is vital in nursing research for its assessment is required for a totally valid research effort in nursing care requirements, staff utilization, and many other aspects of nursing. It appears that quality of care varies as the individual differences of the patients vary and for this reason one acceptable standard or set of standards may never be evolved.

In this article, Nadler and Sahney present a nursing care model in an effort to identify all factors that affect the quality of patient care. This is not a research study but was established to be applied in a research project at the University of Wisconsin hospitals where attempts were being made to measure patient care quality. The model is designed to present a framework on which to develop factors of measurements for assessing quality. An attempt was made to identify all factors that affect quality of patient care. Subdivisions are made until specific factors of care are reached. The questioning attitude of the investigator is essential to the use of the model.

The approach presents us with the vast number of variables that must be considered in the assessment of nursing care quality. While this article does not provide sufficient information for adequate use of the models, it does provide us with an innovative approach to nursing care quality assessment and to the development of a questioning attitude that must exist. This article has a fundamental value for all nursing personnel.

D34. Preston, Ruth A. "Add Meaning to Your Hospital Census." ***Nursing Outlook*****, Vol. 10, No. 7 (July 1962), 466–468.**

Review

Census figures, identified in relation to patients' needs, can represent much more than number of patients admitted or discharged. The Johns Hopkins classification of patient systems developed by Connor is a tool that reflects the daily patient condition. The list is completed by the day charge nurse on each inpatient ward, except in pediatrics and psychiatry, and is sent to the nursing supervisor who classifies each patient using the criteria for categorization. A summary for each service is forwarded to the main nursing office. Three distinct groupings of patients were identified, and the average time consumed in giving direct nursing care is ½ hour for self-care, 1 hour for partial care, and 1½ hours for total care. A simplified checklist shows a progression from self-help to total dependency. Comparison of the checklist over several days for one patient shows his progress in ability to meet his own needs. The use of the daily patient condition sheet provides a continuous record of the total census and the number of patients in each category. Multiplying the total number of patients in each category by an estimate of the average hours of direct care provides a direct care index figure.

This system improves communication by providing specific, objective, data and decreases the involvement of personal identification in administrative decisions. This system provides an objective measure for comparing and identifying variance between floors or services. The hypothesis that the census alone is not an indication of the nursing workload was verified by census work sampling study, revealing that the nursing workload varies directly with the number of patients classified as total care patients.

Carbon copies of the daily checklists were helpful to nursing personnel on the unit as a pictorial reference for the nursing needs of the entire ward population and for identifying each patient's ability to care for himself. Part-time and relief personnel as well as instructors found the information valuable.

The "controlled variable staffing," a pattern suggested by Operations Research at Johns Hopkins Hospital, presents a breakdown of census figures that provides information for strengthening and clarifying nursing service requests for personnel.

A color code denotes different categories of patients, enables quick identification of all complete care patients, and is useful in evacuation, fire disaster procedures, or community disasters. Color coding has special merit for hospitals that do not group patients according to their medical and nursing needs.

Patient classification is a method of accumulating information for improved administration of nursing care. Key criteria can be added to the patient condition sheet and enhance the tool for communication purposes.

Critique

Classification of patients into categories according to care needs is not a new concept. It has been widely used in staff utilization studies and in the determination of staffing requirements. The classification of patients by care need was found to be a decided improvement in determination of staffing requirements over the method of staffing according to number of beds, though it is generally lacking in care quality assessment.

Preston's article identifies other uses for the care classification system. She reports the procedure for and the uses of a tool developed by Operations Research at Johns Hopkins Hospital, (a daily patient describing condition checklist). This is not a research study but is an article describing the development of and the procedure for the use of the patient classification form that is included in the article. Patient need categories are identified but development of criteria for categorization is only briefly described, which limits the value of the article. Average times for nursing care require for each category are established. Uses of the form are described as • a resumé of patients' progress, • identification of the direct nursing care workload, • improved communications system, • a basis for improved staffing and nursing personnel utilization, • orientation of new personnel to patients' conditions, • more critical evaluation of present staffing patterns and basis for strengthening and clarifying nursing service requests for personnel, and • quick identification of complete care patients and an accumulation of information about the patients for reporting.

The tool described in this article would undoubtedly provide valuable information for nursing personnel. However, nursing care quality does not appear to be considered in the development of staffing patterns, staffing assignments, and nurse utilization. Insufficient information is included to evaluate adequately the validity of the information secured by this form in relation to the uses derived from it.

D35. Rich, Rosemary, and Dent, James K. "Patients Rating Scale." *Nursing Research*, Vol. 11, No. 3 (Summer 1962), 163–171.

Review

Purpose.—To determine whether different types of nursing care result in a change in attitudes of nursing personnel toward their patients.

To develop an instrument for assessing attitudes of personnel toward chronically ill patients, primarily concerned with positive and negative effect.

To answer the question, Do nursing personnel's attitudes change in a positive direction?

Premises.—(a) This study is built on the premise that attitudes of nursing personnel toward their patients are important to the quality of care given;

(b) that negative feelings can be used constructively but few people will admit to having such feelings.

Methodology.—In constructing the preliminary questionnaire the investigators used adjectives in the items, based on the supposition that adjectives yield a measure of the emotional components of interpersonal attitudes. The items were selected by faculty who had experience with nurses caring for the chronically ill. The items contained material common to the nursing situation, and they were screened through "Thorndike" to eliminate words not used as cut-off points. Both checklist and scale-type questions were included to determine their relative reliability and validity by empirical correlations.

The original questionnaire (included) consisted of 28 items in a checklist, using adjectives or short phrases that have positive or negative connotations, and two general questions, one to measure overall attitudes of nursing personnel toward the patient as a patient and the other to measure attitudes toward him as a person. Six empirical criteria were the basis for the selection of good items and for the arrangement of a series of measurement situations. A cumulative record of performance on items was made with respect to each criterion. At the end of the process, least desirable items were dropped.

In selection of the items, the following six empirical criteria were used: • stability of response in a test-retest situation, • change in response when a patient changed, • agreement in response between raters when describing a given patient, • variation in response across patients, • dimensionality; i.e., the degree to which the item is positive or negative, and • clarity of meaning.

Each of the six criteria used yielded a list of reject items. When compared, there was far from perfect agreement as to which items were least desirable. There are a number of dimensions to this kind of instrument and the several criteria are concerned with these different dimensions.

The final instrument (which is shown in the article) presents the rating scale. Items that did not perform well on the majority of criteria are eliminated. Positive scores are the sum of values 3, 2, 1, 0, assigned by judges as positive. Examples are "cooperative," "a model patient," "appreciative," "obedient," "friendly," and "good." Eleven negative items selected are "grouchy," "hard to please," "a nuisance," "gossipy," "chronic complainer," "attention seeker," "selfish," "untidy," "childish," "asks too many questions," and "hostile." Numerical values 0, 1, 2, and 3 were assigned to the four columns, and the sum of the values for each term constituted the negative score.

Coefficients of correlation between positive and negative scores from ratings by nursing students and hospital personnel are shown in table 1.

The extremely low coefficients of correlation for these ratings appear to be due to the restricted range of the scores. All of the nursing personnel were extremely positive toward all of their patients.

Indices of validity and reliability.—Mean scores and test-retest reliability coefficients of total scores are shown in table 2. These are compared to those obtained 48 hours later.

Internal consistency was measured by a split half comparison—three positive and five negative works were assigned at random. Split half scores were compiled from Groups A and B and from earlier rater Group D. First and second ratings are treated separately. Correlations are corrected by Spearman-Brown prophecy formulas. Split half reliability coefficients of total scores from ratings by nursing students and hospital personnel are shown in table 3.

Coefficients of correlations between total scores of independent raters were done (table 4). High interrater agreement indicates that there is a common norm about the characteristics of the good patient. Low agreement indicates that the instrument measures individual preferences of nurses for a particular patient.

"Generally speaking the instrument seems to measure individual attitudes toward particular patients but there is evidence that there is a common norm regarding characteristics of a good patient."

To determine validity as to whether certain types of nursing care could effect a change in attitude of nursing personnel toward patients, 24 practical nurses rated a man portrayed in the film "This is Nursing." Changes in the man's behavior in the first and second parts of the film are dramatic. Ratings were made after the first half of the film and again at the end.

Correlations between midpoint and final ratings are low for positive and negative and total scores (.10, .35, .18) and one-tailed "t" test between correlated mean indicates that in each instance the change was significant and in the appropriate direction. Mean positive, negative, and total scores from ratings by 24 practical nursing students at the midpoint and at the end of the film, with the values for the difference between correlated means, are shown in table 5.

Summary and conclusions.—

- It was felt advisable to check a prior notion on a relevant population in that judges were unable to predict which items were considered negative by hospital personnel. There was indication that attitudes of personnel in hospitals differed from those of student nurses.
- As a result of item analysis, six items with positive meanings and 11 items having negative meanings were retained. Four neutral words were retained representing a separate descriptive "resignation" score—the patient's interval in getting well. It is questioned whether the resignation score is descriptive of the patient.
- Reliability test scores measuring positive and negative attitudes indicate excellent stability and internal consistency and acceptable interrater agreement. There was evidence of face validity in that the instrument detects change in common stimulus.
- The instrument was not sufficiently sensitive to measure attitudes toward patients in hospital Groups A and B. It was explained in the fact that the hospital situation was reported to be an exceptionally happy one.
- In categories of general questions, the index of the 11 negatives was about the same as that for a positive index of only six items. It was thought that this was due to the altruistic motives of hospital personnel.

Critique

Rich and Dent attempt to assess the attitudes of nursing personnel toward patients, based on the assumption that attitudes of nursing personnel in regard to their patients are important to the quality of care given. According to the authors, Wandelt's investigation of "Uninterrupted Patient Care and Nursing Requirements," brought to light the need for this study.

The major portion of the study is devoted to the construction of a questionnaire for the assessment of attitudes. Items on the questionnaire were selected on the basis of six "empirical criteria": stability of response, change in response when a patient changed, agreement in responses, variations in response across patients, dimensionality, and clarity. Five faculty members were used as judges. Tests of validity and reliability are described. Levels of personnel used in the testing are not consistent. The sample of patients studied is small and not clearly defined. Attitudes of professional nurses, student nurses, and practical nurses are assessed in the final study.

The development of the theoretical framework of the study is lacking. Literature review is omitted.

Attitudes of nursing personnel toward their patients have long been considered of great importance in the recovery of the patients. A basic principle of nursing education surrounds the formation of nurses' attitudes in the acceptance of the patients. This in itself presents a confounding variable that must be considered in the study of nursing personnel attitudes. Results show that this was not controlled. It would seem that the assessment of attitudes of the various levels of personnel in the study would only lead to further complications.

Great effort was expended by the investigators to select wording of the questionnaire that would provide uniformity in the connotations placed on the descriptive terms by the raters. Undoubtedly improvements were accomplished through their efforts though it is unlikely that they were totally successful. Use of the three levels of personnel with varied educational backgrounds would make the control of this variable more difficult.

Because of the deficiencies found in this study, it is unlikely that it makes any contribution to nurse staffing research design. However, the development of the questionnaire is interesting and could have some value for persons interested in assessing nursing personnel attitudes.

D36. Safford, Beverly J., and Schlotfeldt, Rozella M. "Nursing Service Staffing and Quality of Nursing Care." ***Nursing Research*****, Vol. 9, No. 3 (Summer 1960), 149–154.**

Review

Problem.—To evaluate and study in one hospital the quality of nursing care provided under different staffing patterns; to test the hypothesis that nursing care provided selected groups of patients decreases when number of patients assigned to nurses increases.

Hypothesis.—Quality nursing care will decrease as nurses' responsibilities increase through assignment of additional patients. Quality nursing care is defined for the purpose of this study.

Setting.—The study was conducted in a 340-bed, acute, general hospital operated under municipal control, accredited by the JCHA. It has a nursing school accredited by NLN. A 36-bed surgical private patient unit and a 65 bed surgical unit housed private and staff patients. Staff physicians, medical and surgical interns, and residents provided the medical care. Registered nurses supervised all nursing care. Practical nurses and orderlies gave direct nursing care except administration of medications.

Instrument.—Construction of a questionnaire was based on the following criteria:

- The instrument should measure components of quality of nursing care identified by nursing service personnel, nursing education personnel, physicians, hospital administrators, and patients in the hospital under study.
- Forms of the instrument should be designed with appropriate modifications to permit measuring quality of nursing care from the points of view of all respondents, including patients and personnel.

A Committee on Criteria for Optimal Nursing Care was established. Membership included nursing and hospital administrators, nursing school faculty, staff physicians specializing in surgery and internal medicine, head nurses from surgical and medical units, and two study directors. Functions of the committee are outlined: (a) identify factors important to good nursing care, (b) serve as jurors to decide if nursing actions were important to good nursing care, and (c) decide on the final form of the questionnaire. Free response questionnaires were sent to 25 persons including nursing and medical personnel and patients. Questions asked were, • What factors do you consider most important to good nursing care? • What are other factors important to good nursing care? • Give an example of good nursing care. The initial instrument was developed from answers to these questions. Based on four criteria sets by the investigators, components of nursing care were grouped into five major categories: (a) physical care, (b) emotional care, (c) nurse-physician relationships, (d) teaching and preparation for home care, and (e) administration. The study directors developed a trial questionnaire based on the five categories providing answers "always," "usually," "sometimes," "seldom," or "never." Wording of questionnaires was adjusted for respondents to eliminate self-evaluation. Questionnaires were reviewed by the committee and tested on two hospital units not included in the study, and suggestions for improvements were made by the criteria committee. The questionnaire is not included with the study.

Validity was checked. It was assumed that since the items were said to be impartial by persons directly involved with nursing practice, this fulfilled the criterion of face validity. Questionnaires were placed in three groups according to responses. A random sample of 15 was selected from the 210 very good or excellent responses and 15 from the fair or unsatisfactory. The 45 satisfactory responses were not included. Mean scores were compared; homogeneity of variance within the two scores was set. The "t" test was used to determine significance of difference. The obtained value (9.06) is significant beyond the .01 level, indicating that the two scores were not from a single population and that the instrument was valid.

Method.—Quality of nursing care was to be evaluated through use of questionnaires distributed to patients and personnel. Circumstances were assumed to be constant except for numbers of patients. Staffing would be considered optimal, then staffing would be altered by the addition of patients to the team and quality of nursing care would be reassessed after a 2-week period. No decisions were made as to the number of times patient assignments would be altered and quality of care evaluations made. This was limited because of added responsibilities of personnel.

The basic plan included a head nurse and nursing teams headed by registered nurses who worked with two practical nurses. Ward secretaries were available in a ratio of 1:30 patients. An orderly was available to perform direct and indirect nursing care but he also worked on one or more other units. Evening and night personnel remained constant.

Nurse participants were oriented to the purpose of the study and 13 patients assigned to each team. Physicians were sent letters informing them of the study and patients' charts were marked for inclusion in the study.

Instruction sheets were sent with the questionnaires. Physicians and patients were asked to evaluate nursing care between 7 a.m. and 3:30 p.m. during 7 days prior to receiving the questionnaire. Patients who had received care from the study team for three consecutive days were asked to fill out questionnaires.

To stabilize staffing patterns, a 7-day orientation period was held preceding each study period. This allowed directors to observe for difficulties.

The study week ran from Monday through Sunday; patients discharged after 3 days were asked to complete questionnaires. Personnel were distributed questionnaires on Monday following the study week.

Staffing teams remained constant throughout the three study phases. Numbers of patients increased were designated by pattern. Thirteen patients were pattern A, 16 pattern B, and 19 pattern C.

A procedure for scoring questionnaires was set. Values were assigned to each item according to frequency of occurence 5–1, 5 always and 1 never. Items answered "yes," "partially," and "no" were scored 5, 3, and 1 respectively. Unanswered questions were given scores of 3.

Analysis.—For each class of respondents, the total number of responses at each level was calculated and subtotals determined for each of the five categories of items. Numerical indexes of overall quality of nursing care by class of respondents were determined. To obtain numerical indexes of overall quality of nursing care by class of respondents, total number of each class of responses at each level was multiplied by its appropriate numerical value. These products were totaled and the total divided by the number of items on the questionnaires, and then the total of the products was divided by the remainder of respondents in the group. A similar procedure was used to calculate numerical indexes of quality of nursing care for each category (physical care, emotional care, nurse-physician relationship, administration, teaching, and preparation for home care). This procedure provided weighted mean scores under the three staffing patterns for the five categories of patient care and for all categories of nursing care combined (as assessed by each class of respondents and by all classes of respondents combined). Scores were separate for medical and surgical units.

Findings.—Data analysis was directed to answering the following questions:

- To what extent is quality of care altered when numbers of patients assigned to teams are increased?
- To what extent do patients and various categories of personnel agree in their assessment of quality of nursing care?
- Are there particular categories of nursing care evaluated to be of relatively high or low quality?
- To what extent do evaluations of quality of nursing care differ for medical and surgical patients?

Staffing pattern A was consistently evaluated to be of high quality.

The hypothesis that quality of nursing care decreased with increased numbers of patients is generally supported (shown in table 1).

Categories of care that more consistently rated high in quality were administration and nurse-physician relationships (shown in table 2).

Teaching and preparation for home care were consistently evaluated by all respondents to be lowest in quality.

Physical care was most reduced by increased patient load (shown in table 3). This was also thought to affect accuracy.

Quality of nursing care on the surgical unit was rated higher than on the medical unit under staffing patterns A and B. Care staffing pattern C was evaluated by all respondents to be of lower quality on the surgical unit than on the medical unit (shown in table 4).

Tests comparing evaluations of quality of nursing care made by respondents under the three staffing patterns (shown in table 5) were done to determine statistical significance of the findings that quality of care decreases as there is an increased number of patients. Frequency of excellent responses is compared to all other responses under the three staffing patterns. No significance is shown on the medical service while consistency was shown on the surgical service.

Comparing evaluations of quality of nursing care made by all respondents under staffing patterns A and C (shown in table 6), number of responses indicating excellent nursing care under staffing patterns A and C and combined numbers of all other responses under these two staffing patterns were entered in a two by two table and, applying Yates' correction for continuity, the X^2 value was determined. An X^2 value of 3.99 shows that fewer excellent responses could be expected when pattern C rather than A was in effect.

An item analysis was done which indicated that spiritual needs of the patients and preparation for home care were not being met under all these staffing levels.

Summary.—All personnel reported that care given to patients normally decreased in quality of nursing care as assignments increased. Patients' responses indicated overall quality of care increased very slightly under increased assignment but markedly decreased when 19 patients were assigned to each team.

The study demonstrated that workload of nursing personnel was definitely related to quality of nursing care provided patients. It was suggested that findings may be used to guide administrative personnel in the resolution of problems and in relation to staffing patterns to improve patient care.

Critique

The problem of nursing service staffing as it relates to quality of care is confusing. The many research attempts directed in this area have produced varying results. Until an adequate definition of nursing care quality assessment can be accomplished, this relative question of staffing will be determined on more readily observable factors such as numbers of procedures and degree of patient illness.

Safford and Schlotfeldt attempt to evaluate the quality of nursing care under different staffing patterns to test the hypothesis that quality of nursing care provided to selected groups of patients decreases when numbers of patients assigned to the nurse increases. Rationale for the study is lacking, for basing nursing care quality on the satisfactions of patients and personnel alone leaves much to be desired, and adequate assessment is difficult.

The experimental design of the study involved altering the number of patients to a constant number of staff. Levels of patient illness are not described. Data were collected by the survey method; a questionnaire was employed. This was developed by a Committee on Criteria for Optimal Nursing Care based on five major categories considered important to good nursing: (a) physical care, (b) emotional care, (c) nurse-physician relationships, (d) teaching and preparation for home care, and (e) administration (only briefly defined). The assessment instrument is not included. Validity of the instrument was based on one statistical test not described and because it was developed by persons directly involved in nursing practice, validity was assumed. No attempt is described to allow for the bias and subjectivity that occurs in this type of data collection. The sample is adequate.

This study report presents a summary of the research study, and much of the pertinent information required for its assessment is lacking. Nursing administrators and research investigators should find it interesting as one contribution to the study of nursing care quality. This article makes a contribution to nursing research staffing design since it is an attempt to evaluate size of nursing assignment and, thereby, workload. It is really a test of how much data one nursing team, comprised of a specific number of personnel, can handle.

D37. Saren, Martin, and Straub, Anton. "Nursing Service Effectiveness." ***Hospitals, J.A.H.A. (Journal of the American Hospital Association),*** **Vol. 44, No. 2 (January 16, 1970), 45–50.**

Review

Purpose.—The purpose of the study was "to establish a basis for meaningful involvement by hospital administration in the determination of goals, standards, and evaluation techniques in the assessment of a major hospital activity." Also the effort was made "to develop a data system . . . to perpetually assess the effectiveness of service in terms of economy of nursing care." Six hospitals (five in Long Island, New York, and one in Philadelphia) participated in the study and afforded variety in size, type, ownership, and locale.

Method.—Methodology included: (a) work sampling (random sampling every 15 minutes for 7 consecutive days of all nursing activities (all levels of personnel)), (a) continuous observation—to obtain quantitative data on amount of time in direct patient care by each level of personnel, and (c) patient rating classification (refined Johns Hopkins method).

Results.—The continuous observation and patient rating classification were done by registered nurses. Largest proportion of nursing personnel time was found to involve record keeping, communication, and nonnursing functions. Twenty percent of the registered nurses' time was devoted to "professional" patient care activity. Activities were reassigned by registered nurses on the capability of auxiliary nursing personnel. All (except for passing out medication and a relatively small number of skill functions) could be reassigned to auxiliary staff. Patient rating results found a large majority of patients classified as Grades 1 and 2 (lesser care requirements); therefore, most nursing requirements can be satisfied by properly trained personnel other than the registered nurse, to a far greater extent than usually is recognized.

"Units of service ratio" is the relation between units of service and hours worked. It indicates effectiveness in personnel utilization according to cost (new method of determining nursing service cost which considers personnel utilization). The authors conclude that job activity frequently is unrelated to skill level, and that work activity is not scheduled over the 24-hour period logically. Many activities being performed by nurses could more effectively and more logically be the responsibility of other departments. According to the authors, there appeared to be a severe management void in regard to planned patient care and patient care appraisal. Findings suggest that there is a useful basis for administrative professional concern with effective personnel utilization.

Critique

Rising hospital costs have stimulated a number of disciplines to study nursing activities for the specific purpose of discovering ways of reducing hospital costs. These studies are directed to the area of nursing service staffing since it commands a major portion of the hospital's budget. The study arose at the recommendation of the New York Governor's Committee on Hospital Costs and is conducted by persons educated in Hospital Administrative Medicine.

The purpose of the study was to place in clearer perspective those goals, standards, and evaluative techniques that have administrative as well as professional implications and to develop a data system for perpetual assessment of the effectiveness of nursing in terms of economy.

Rationale for the study is developed. The theoretical framework is lacking. A literature review and bibliography are not included.

The survey methodology is applied in the study. The work sampling technique is employed in the study of nursing activities. Continuous observation is employed in the study of bedside care activities. These are described in general terms. Assessment instruments are not described or included. Patient ratings are done to indicate the amount of patient care required. Daily weighted numerical values are assigned to patients. Grades or levels of patients are identified according to a refined Johns Hopkins method. Untis of the amount of care required are assigned to each grade. Samples are adequate to large. No attempt was made to assess quality of care.

This article does not include sufficient information to assess the research techniques applied. The value of the study lies in the picture it provides of the numbers and types of tasks carried out by nurses. As so often occurs when outside disciplines study in the field of nursing, judgments in regard to application of the findings are based on number of tasks performed and time required to perform them without any consideration to quality of care, patient and personnel satisfaction, or the abilities of the various levels of nursing personnel. In this particular study the concerted efforts to reduce cost led them to suggest that auxiliary nursing personnel be trained to provide the psychosocial needs of the patient. The question is, Does this level of personnel have the background or ability to provide this type of care? It would seem more appropriate to leave such judgments in regard to the specifics of nursing care to nursing leadership in the institution. A more reasonable approach would be the establishment of *priorities* of care to be given.

The innovative feature of the report is the grading system applied in personnel assignment. Lack of information makes it impossible to determine from this article whether or not there is a contribution to nurse staffing design.

D38. Schwier, Mildred E., and Gardella, Frances A. "Identifying the Need for Change in Nursing Service." *Nursing Outlook*, Vol. 18, No. 4, (April 1970), 56–62.

Review

Purpose.—The purpose of this article is to describe the program that became the core of a research project begun in 1965 and supported by the USPHS.

Sample.—The Rhode Island Hospital is a 570 bed, voluntary, nonprofit hospital. Approximately 53,000 patients are treated in the emergency room and clinics each year. The nursing staff is composed of 486 full-time and 296 part-time members. The nursing service department "was organized in the traditional vertical pattern of authority, responsibility, and accountability." Staff administrative personnel, consisting of 13 members, four of whom held master's degrees, met regularly, but their decisions dealt largely with day-to-day problems. "Through an organized program of reading, field visits, and professional meetings, the group gradually developed an awareness of their responsibility for providing leadership in regard to problems and issues." The group broadened its membership to include evening and night supervisors and identified some of the major problems surrounding the delivery of nursing care, recognized the need for far-reaching change, and accepted the responsibility for assuming leadership.

Instruments.—The steering committee began to involve the registered nurse personnel in the development and continuous study of objectives for the nursing service department. The foundation statement reads: "It covered the following areas: care of the patient as an individual; patient safety and comfort; nurse responsibility for observing, recording, and reporting; nurse responsibility for patient teaching and management; evaluation of patient care, including attention to restoration and continuity of care; management of tasks delegated through the medical plan; recognition of the physician as head of the therapeutic team; and coordination by the nurse of all activities related to the care of the patient at the unit level." There were significant differences among personnel in regard to their understanding of this statement. A major source of frustration was that, although nursing staff was involved in the activities of all other departments and carried responsibility in relation to them, they had no authority to make final decisions. The foundation statement was considered idealistic. Clarification of current roles and functions in nursing leadership was necessary. The duties of the supervisor and head nurse were examined.

With the help of the psychology department, a questionnaire was formulated to obtain information from personnel regarding their views of the roles and functions. The psychologist also worked with the nursing department in conducting a series of conferences for supervisors and another series for head nurses. The information gained from these two sources revealed that these nurses had a real concern for patients, a willingness to work with other departments, and a recognition of the complexity of the job of their immediate supervisors. The supervisors felt themselves well prepared in the clinical practice field but inadequately prepared to deal with complex management problems. Both the supervisor and head nurse believed their immediate supervisors were willing and competent to assist in the solution of these problems but were too frequently unable to give adequate guidance because of their own responsibilities. They often turned to each other for help and relied heavily on the trial and error method. The director of nursing and some members of the steering committee considered the negative findings as valid reasons for promoting change.

Procedure.—All the information accumulated by the steering committee was channeled to the hospital administrator and hospital management committees in order to gain understanding of the need for change, to interpret nursing goals as stated in beliefs and objectives, to identify ways in which current operation interfered with the achievement of objectives, and to enlist support for change. A multidisciplinary advisory committee made up of representatives from administration, nursing, the medical staff, the personnel department, and the department of psychology was established to study the activities of the head nurse. This group revealed that 33 percent of the head nurse's time and 44 percent of her activity involved relationships with other departments or with functions not directly related to patient care. The longer the head nurse stayed in her position, the more she became preoccupied with nonnursing responsibilities. The interdisciplinary group revealed that there was wide discrepancy between traditional roles and the roles implied in the beliefs and functions, that the organization of the department of nursing perpetuated these roles, and that leadership personnel in nursing lacked opportunity to carry out objectives.

Immediately, the nursing department developed supervisory workshops, special courses in administration, recruitment activities, refresher courses, more inservice staff, more nurse aide classes, classes for potential head nurses, and continuing classes in team nursing. Field trips were made to other hospitals.

Results.—The steering committee concluded that the Rhode Island Hospital must • identify proper roles and functions of nursing and nursing leadership in relation to objectives, • outline a deliberate course of action to permit fulfillment of these roles, and • recommend changes in hospital structure and evaluate effect of these changes in nursing care.

The steering committee of the nursing service department identified broad categories of activity as appropriate for a unit manager. They decided that unit managers functioning as an integral part of the nursing department simply gave nursing personnel final responsibility for the management and not necessarily result in the redirection of their thinking and energies toward the improvement of nursing practices.

The steering committee then began to concentrate on two areas of responsibility in order to bring about change in the quality of nursing practice and the behavior of nursing personnel at the unit level. The nursing staff must be guided in giving their care. A report was submitted to the executive director from the department of nursing suggesting a demonstration project in nursing service through changes in the utilization of nursing practices. It was suggested that the unit manager system be under the control of the hospital administrator, that a coordinator of unit services develop unit managers, that qualified nurse leaders be appointed to recognize nursing services at the unit level, and the nurse leaders be reoriented.

Qualifications for the nurse leader were listed as • a master's degree and good knowledge of a clinical specialty; • competence in nursing, supervision, and inservice education in nursing; • ability to participate in research and to create or conduct studies; and • ability to work with others. Her responsibilities were foreseen as • participating in the development of the project and the transfer of nonnursing duties; • setting up and putting into effect a training program for reorientation of nursing personnel; • training assistants for such tasks as interviewing and teaching patients and their families, determining patient needs, making effective use of care plans, audits, medical nursing rounds, orienting and teaching new personnel, and evaluating personnel performance; • knowing problems and progress of all patients; • knowing abilities, progress, and problems of all nursing personnel; • working with physicians through rounds, conferences, etc., to improve patient care; • participating in direct care through work with assistants by teaching, demonstrations, and planning; • interviewing nursing personnel for appointments or terminations; • planning time schedules and staff assignments; • keeping the department informed of progress, plans, problems, etc.; and • participating appropriately in other activities designed to improve nursing care.

The proposals for reorganization of nursing services at the unit level include the number and kind of personnel changes, a plan for reorganizing the nursing service at the unit level, the tentative job responsibilities, and a timetable for change.

The suggestions in this report were approved for further action by the hospital director. The director of nursing, the head of the psychology department, and a representative of hospital administration developed a proposal for a research project to be submitted to HEW. The hypothesis stated that conditions that would allow the nurse opportunity to use knowledge and skill more appropriately would result in better patient care, improvement of communication between physicians and nurses, meaningful nurse-patient communication, more effective implementation of medical orders, improvement of nursing care plans, and improvement in patient comfort.

The receiving of the USPHS grant was followed by creation of a design in which improvement of nursing practice could take place.

Critique

Social concepts of health needs have changed as population has changed in regard to numbers and age groups. Consequently, hospitals have been required to change to meet society's demands. Insufficient nurses are available to meet society's needs and rising hospital costs have placed the burden of proof on nursing administration. They must provide improved nursing care with a minimum of nursing personnel. This article describes one method applied by one hospital nursing service for identifying the needs for change. Though it only provides its reader with a general description of techniques applied, it is relevant to this study of nursing service staffing.

A logical approach is outlined: (a) determine the need for change; (b) select, interpret, and secure support for goals directed toward change; (c) initiate actions that would lead to change; and (d) provide evaluation of the outcomes of such action. Goals of the programs are to improve patient care, to utilize personnel more effectively, and to provide greater satisfaction for both patients and personnel. This article is devoted to identifying the need for change and the development of a formal plan for change.

Line and staff administrative personnel at the supervisory level or above formed a steering committee. The involvement of nursing personnel in the development and continuous study of a statement of belief and objectives for the nursing service department aided in the identification of problem areas.

A questionnaire, which is not described or included, was employed to elicit the views of the nurses in regard to their roles and functions and to provide identification of problems that existed hospital-wide as well as within the division of nursing. Positive and negative factors are identified in the institution and action initiated to realize the changes.

The value of this article lies in the methods employed to identify the need for change and problems encountered in effecting change. While assessment techniques and instruments are not reproducible, it provides its readers with an approach. It cannot be adequately assessed for its research value due to deficiencies in reporting and makes no contribution to the specifics of nurse staffing research design.

D39. Schwier, Mildred E., and Gardella, Frances A. "Planning, Orienting, and Preparing for a New Kind of Nurse Leadership." *Nursing Outlook*, Vol. 18, No. 5 (May 1970), 42–46.

Review

Purpose.—The purpose is to investigate the effect of specific changes in organizational and administrative patterns made at the patient level in a large general hospital on selected aspects of nursing care and nursing function.

Sample.—A project staff consisted of the project director, director of the psychology department, the delegate of the executive director of the hospital for unit services, and selected nurses. This group selected a 61-bed medical unit as the pilot unit, an experimental unit of 76 patients, and a control unit of 68 patients. These units were as "comparable to each other as possible" and contained mostly surgical patients.

Instruments.—The specific changes proposed were the restructuring of patient units and redefinition of the charge nurse's title and job as well as a reorientation of the nurse to her new responsibilities. These changes would involve the development of a "nurse leader" that would replace the positions of coordinating supervisor, head nurse, and assistant head nurse, and would reallocate nonnursing tasks to a unit service department. It was proposed that two units be combined and that a nurse leader supervise four team leaders. The nurse leader would hold a bachelor's or higher degree and have 3 to 5 years of nursing experience. Four major areas of nursing were to be studied: • the nurse's self-concept; • communication between the nurse, the physician, and the patient; • execution of doctor's orders and adequacy of nursing care plans; and • specific measures of patient comfort and welfare.

To relieve the nurse of broad administrative and managerial responsibilities in nonnursing areas, a unit manager system was implemented. The administrator and representatives of nursing initiated discussions concerning the reallocation of nonnursing functions. The following major areas of activities were identified as functions of a unit service department: • all clerical activities except those having to do with the recording of observations of patient welfare, comfort, response to therapy, and verification of accuracy of transcribed orders; • procurement, maintenance, and control of all supplies and equipment; • coordinator and supervisor of housekeeping and building maintenance activities at the unit level; • environmental control relating to visitors, noise, ventilation, light, and selected communications; and • transporting and messenger activity. It was decided that a unit service supervisor, responsible to a representative of hospital administration, would organize the unit service department.

Structural changes included: • the nurse leader replacing the former supervisor figure, and • responsibility for 75 patients rather than 150. The nurse leader was provided with assistant nurse leaders who were to be responsible for 20 patients each. The fully qualified nurse leader agreed that her commitment extended through the 24-hour period and she would be on call for consultation.

In the administrative hierarchy, the position of associate director was eliminated and four assistant director positions were created to guide nurse leaders in the achievement of departmental objectives.

Procedure.—The first set of data was to be collected before any changes were made; the second set approximately 3 months after the introduction of the unit manager and before the introduction of the nurse leader; and the third set 8 months after the introduction of the nurse leader. The third set of data was not collected on the control unit.

Nursing and medical staffs were informed of the general objectives of the research to be accomplished. Floating of nursing staff to or from the units was avoided.

The prospective nurse leader on the pilot unit had held the position of supervisor but was relieved of all direct service responsibility for 4 months. She met with the director of nursing for 4 to 6 hours a week to review material studied, to select pertinent content, and to organize material into a meaningful plan for effecting change. A syllabus to be used as a point of departure and frame of reference for training nurse leaders was developed. Toward the end of the 4 months, the nurse leader selected candidates for the assistant nurse leader position.

A syllabus containing a statement of assumptions concerning the nurse leader position and overall objectives was used for the reorientation course for nurse leaders. The four parts of the syllabus are (a) understanding the current setting for leadership in nursing, (b) creating a new focus for nursing leadership, (c) promoting change at the unit level, and (d) planning and giving care to a patient or a group of patients according to principles, concepts, and objectives of nursing. Change at the unit level concerns the education of assistant nurse leaders. The assistant nurse leaders spend 3 to 4 hours per week studying the reorientation course as they begin to fill their new positions. Planning and giving care, according to principles, involve study and practice of the techniques of interviewing, communication skills, rounds, care plans, etc.

Summary.—The first assistant nurse leader to take the course to the conclusion did recognize that the organizational structure needed changing. The goal of the research project "was to create a system and a setting that would promote the individualization of patient care and the improvement of nursing practice and nurse job satisfaction." Regardless of outcome of research findings in respect to areas specified for examination, there is improvement in the climate surrounding care and practice.

The following responsibilities were given to the nurse leader: • to develop and execute a plan for her own growth; • to identify nursing care needs of patients in relation to concepts of quality care; • to meet patients' needs; • to identify and understand personnel needs; • to meet personnel needs; • to develop and use statements of beliefs, objectives, and standards of care in her area of activity; and • to systematically evaluate nursing care, personnel development programs, and personnel performance.

"The establishment of the role of the nurse leader has been an outstanding result of the decision of the nursing service department at Rhode Island Hospital to promote and sponsor change in both the organizational structure of the department and in the allocation of duties and responsibilities for nursing personnel."

Critique

This article provides a general description of one research effort that involves the creation of an organizational climate in which the nurse is allowed to function at the patient unit level. The study grew out of concern that the skills of nurses were being misdirected due to their involvement in nonnursing, clerical, and administrative duties.

The purpose of the study was to investigate the effect of specific changes in organization and administrative patterns made at the patient level on selected aspects of nursing care and nursing functions.

Premises for the study are outlined. A steering committee of nursing personnel was involved in planning the study and its progress. A reference list is provided.

The method employed is described in general terms. Assessment tools and procedures for assessment are not included. The sample involved the study of activities on three wards: one used in a pilot study, one used in an experimental unit, and the other in a control unit. Proposed changes are described; a nurse leader replaced the position of coordinating supervisor, head nurse, and assistant head nurse. Identified nonnursing tasks were reallocated to a service unit department. Areas studied were • the nurse's self-concept; • communication between nurse, physician, and patient; • execution of doctors' orders and adequacy of nursing care plans; and • specific measures of patient comfort and welfare.

The approach to the study appears logical. The assessment of techniques and methods employed cannot be made due to lack of information. No contribution to nurse staffing design is evident from this article. The value of this article lies in the descriptive material it provides in the reorientation of the nurse in her new role as nurse leader. Basic concepts, objectives, and philosophies underlying her reorientation program are outlined and discussed, which should prove interesting and informative for nursing administrators and educators.

D40. Smith, Dorothy M. "Education and Service Under One Administration." *Nursing Outlook*, Vol. 13, No. 2 (February 1965), 54–56.

Review

The author compares the functions of the medical profession to those of nursing, stating that nurses are engaged in repeating certain procedures that characterize the more technical aspects of nursing rather than using the techniques of scientific investigators to solve patients' nursing problems. She describes the medical staff in a teaching hospital as "a group consisting of various levels of house staff, medical students, and medical faculty who form a cohesive teaching-learning-service group, who together apply their knowledge and skill to the solving of patients' medical problems." She refers to them as "scientific investigators."

Nursing is described as a profession where the nurse has not worked as an apprentice in the same sense as in other professions. An apprenticeship she described as a situation where there is a close relationship between master and apprentice in a particular field. Student nurses, she says, have traditionally had a divided apprenticeship to hospitals, physicians, and patients, but are beginning to develop their own nurse "clinician masters, their own textbooks and journals, so that a real apprentice situation is beginning to exist."

Holtzhausen is quoted as saying that schools of nursing as they exist are "no part of our hospital organization; the nursing faculty does not bear the same relationship to the hospital as does the faculty of the medical school who has a dual responsibility—education and service." The author states that considerable disunity exists between clinical practitioners and nursing faculty; conflicts have existed between the two factions and for many reasons; "identity has not always been strong and communication has not always been open." This, she states, has resulted in a situation where nurses get their cues for action from other disciplines in practice, such as education and research.

A University of Florida program is described. The State legislature of Florida in 1949 authorized the University of Florida to provide a teaching hospital for medical students and nurses. The two programs were to be operated in the same manner, that of "dual responsibility." It was their opinion that such a program in nursing would unify nursing, reduce conflicts, provide better communication, coordinate educational and service activities, and advance toward common goals of nursing education, practice, and research a setting in which all nurses and students could be problem-solving oriented.

After 7 years with the Dean of the College of Nursing also being Chief of Nursing Practice, it was found that by providing common experiences for nurses in both education and service, solving and managing nursing problems of patients could be more easily realized; that their aims of service, education, and research are reflected in practitioners of nursing and teachers of nursing. The fact that the jobs of education and practice are different promoted unity, resulting in the production of nurse clinicians who are master craftsmen in nursing. It is the contention of the author that much of nursing education or practice is "still largely intuitive and not easily communicated." This, she states, points up the need for large numbers of descriptive nursing practice case studies and improved communication, a situation where all disciplines in nursing contribute to the establishment of the "educational nursing hierarchy," rather than the traditional administrative hierarchy.

The author presents the idea that a unified education and nursing practice approach is one approach to building a nursing science and should replace the old method where theory is taught in classrooms and practice courses are taught on the ward. All nurses in the University of Florida hospital are encouraged to participate in inductive and experimental methods to formulate a nursing science, "a descriptive method of coming to grips with the science of nursing practice." She recommends that the deductive method being used in other institutions proceed simultaneously.

The author states, in defining nursing practice, that nursing practice must concern itself with leadership of a large number of varying levels of nursing personnel who assist in solving the nursing problems of patients in the hospital, in other community agencies, and in the home, and must expand to meet the needs of society or a new group will arise to meet those needs. She contends that the unified organization described in this paper has "made possible the reduction of the lag between present knowledge and practice." This approach includes development of standards of nursing practice and establishment of criteria for the continued evolution of practice.

The author states that the unified approach is basically the application of scientific methods to the solution of problems in nursing. It is her contention that major innovations in solving problems will come from competent nursing research rather than research provided from other disciplines and that previously there has been a lack of understanding of how scientific methods can be used in solving nursing problems. She feels that the teaching hospitals in nursing should make it possible to sharpen scientific study methods, to identify and to solve nursing problems. Through these methods, she states, nurse peer or collaborative relationships are developed and strengthened.

The author points out that dual administrative responsibility has helped the University of Florida to achieve many of its goals, but she adds that each institution must feel free to select the pattern best suited to its values and objectives.

Critique

This article does not report a research study but presents the opinions of the author in regard to organization of nursing education and nursing practice in the hospital setting and the findings of the research program conducted at the University of Florida in 1949, in which nursing education and service were placed under one administration. This inspired the author to compose this article. The basis for the article and the persuasive arguments involving the research approach in the field of nursing establish the relevance of this writing to the study of staffing research.

The author identifies the many deficiencies that exist in nursing service and nursing education methods, organizational patterns, nursing practices and methods, and in basic nursing philosophies.

Comparing the organization of nursing education and service to that of medicine, the author points out the absence of cohesive learning and teaching in nursing, the absence of active change, growing, and learning, the existence of disunity within the hospital organization and between educators and clinical practitioners resulting in lack of communication. The need to move from the procedure method of teaching to the technique of problem solving and the need for the application of scientific research methods in solving problems is emphasized.

This is a thought producing article. But to assume that the presence of a nursing administrator with dual responsibilities for education and service is the total answer to these problems is questionable. No doubt the accomplishments of these changes would be greatly enhanced by this type of administration, providing the individual brings the proper orientation and philosophy to the position. The educational implications involved in the solution to these problems are not elaborated upon.

This article cannot be assessed as a research study and makes limited contribution to nurse staffing design.

D41. Steiner, Bernice H., and Lindquist, Norman E. "Surprise Find of Staffing Study: Nurses Have Too Much Spare Time." ***Modern Hospital,*** **Vol. 114, No. 2 (February 1970), 108–110.**

Review

Purpose.—"To determine by some objective measure how much time nurses were spending on each aspect of their jobs and thereby to find some more accurate basis than a mere body count for staffing ratios."

The study was conducted at Touro Infirmary, a 534-bed research teaching institution in New Orleans, by Touro's administrative staff, and the industrial engineering staff of the computing sciences division, Aerojet General Corporation, Sacramento, California, performed the observations. An attempt was made to determine the following factors: • nursing duties free of nonnursing responsibilities, • patterns of staffing and scheduling based on patients' need for nursing service, • need for departmentalization, • total nursing personnel needs, and • cost accounting basis for allocating nursing service expenses.

Method.—The study was organized in three phases:

(a) Patient ratio categories and codes were developed from activity categories and codes established by the industrial engineers in preliminary studies. Pilot studies were conducted on two wards to test patient rating and activity categories, to determine criteria for staffing units, and to check the feasibility of the study plan; (b) The study on the remaining wards by the project manager and observer corps was implemented. The industrial engineer acted as training liaison and supervisor. He also converted and analyzed data, computerized findings, and implemented recommendations; and (c) Findings were computerized and recommendations implemented after acceptance by Touro's administration. Observations consisted of round-the-clock work sampling for 1 week. Each observer monitored two adjacent units of 35 beds on three smaller units. A project manager served as coordinator between the engineers and personnel. A steering committee consisting of representatives from nursing and general administration departments made judgments as necessary.

During the pilot study, nursing activities, based on observations, were grouped into • daily living needs based on patient dependency needs, • treatment and care based on type of patient illness, • ward management including communication with or about patients, and • administrative allowances including unaccounted for time.

The unit charge nurses on each shift rated each patient according to level of illness and degree of dependency and estimated the time needed to care for each patient. A correlation between the two emerged and was used in the development of a standard.

Findings and analysis of data.—Data were programed, computerized, and analyzed and standards developed. The pilot study showed that from 39 percent to 46 percent of nursing time was spent in administration and from 23 percent to 35 percent in patient treatment and care. All classes of personnel had responsibilities in each area. Functions of registered nurses and licensed practical nurses were similar when they were in charge. Standby time was from 18 percent to 21 percent for all personnel for a 24-hour period, 15 percent on day shift and 29 percent on the night shift. Orderlies ranked highest.

From work sampling data on the 19 units, the objectives of the engineers were to • identify areas in which personnel were making less than optimal use of their time and talents, • identify differences in units and reasons for differences, and • provide basis for reassigning duties to benefit patients and personnel.

Findings were presented to the steering committee to determine • hospital standards for minimum levels of patient treatment and care on units; • amount of personal and delay time for personnel; • amount of standby time; and • staffing pattern for head nurses, registered nurses, and licensed practical nurses.

Results.—Nursing units were grouped into four groups by physical similarity and proximity to provide larger data based on improved reliability of standards.

Nursing time required according to level and type of case was determined from time estimates by charge nurses. Standard times for daily living, treatment, and care were allocated to each level of personnel.

Application of the nursing standards to the hospital was scheduled to be computerized for economic feasibility and simplicity. Paperwork was kept to a minimum. Several standard forms were changed for more efficient use.

Recommendations.—

- The staffing system should be tested by census input method.
- The same concepts should be applied to special nursing areas: intensive care, coronary unit, etc.
- Supervisors should be made responsible for nursing units scheduling and the use of study results applied.
- Job descriptions should be written for all classes of personnel.
- Daily housekeeping tasks within patients' rooms should be assigned to nursing personnel.
- Patients' meals should be served by nursing personnel, patients to be assisted and observed at the same time.

Critique

This article provides the report of a research study performed at Touro Infirmary, New Orleans. It was conducted by Touro's administrative staff and the industrial engineering staff of the computing sciences division, Aerojet General Corporation, in an effort to better utilize staff and reduce hospital costs.

The purpose of the study was to determine by some objective measure how much time nurses spend on each aspect of their jobs and thereby find some more accurate basis than number of patients for staffing ratios.

The theoretical framework of the study is not developed. Areas studied were • nursing duties free of nonnursing responsibilities, • patterns of staffing based on patients' needs for nursing service, • need for departmentalization, • total nursing personnel needed, and • cost accounting basis for allocating nursing service expenses.

The survey methodology was used in the study. The work sampling technique is employed in around the clock observation; this is briefly described. The sample appears to be large. Three phases of the study are identified:

> Nursing activity categories, codes, and patient rating categories were established. Nursing care categories are only briefly described; 1. daily living needs, 2. treatment and care, 3. ward management, and 4. administrative allowances. Patient categories are not defined or described. A pilot study was conducted.

(b) Implementation of the study on all wards.
(c) Computerization of the findings and implementation of recommendations.

No attempt was made to assess quality of nursing care.

Insufficient information is provided to adequately evaluate this study. The assignment of housekeeping and dietary duties to nursing personnel to occupy idle time seems inappropriate and wasteful. An investigation into the organization of the units and readjustments in nursing activities would undoubtedly provide assignments where their talents could be better utilized.

D42. "Unit Management Well Established: Employees Enthusiastic About System." ***Hospital Topics,*** **Vol. 44, No. 7 (July 1966), 67–70 and 73. (Anonymous).**

Review

This article describes the establishment of unit management in University Hospital, Ann Arbor, Michigan, a 1,000-bed hospital. The implementation of this program was done in an effort to improve the quality of patient care by relieving nurses of nonnursing duties. Existing problems are described as staff shortages, high turnover rates, complexities of relationships with other departments, inefficient procedures, conflict of interests (patient care vs. nonnursing care duties), conflict of direction (administration, nursing office, medical staff), and failure of supporting departments to supply services as needed.

Method.—At the suggestion of the industrial engineering group, a service unit directly responsible to administration was developed on a pilot basis to handle all nonnursing activities. Experience evidenced the need for administrative support in light of the many changes required, redefinition of jobs, and changes in responsibilities and procedures of supporting departments. Channels of communication were charted. An around the clock administrative assistant was employed.

A utilization study was carried out. Personnel activities were classified: (a) unit management, (b) outpatient, (c) dietary, and (d) inservice development. It was found that 50 percent of the nurses' time was spent in nonnurse functions and 45 percent of nurse aide time was spent in activities not related to bedside care.

In 1962, a project director responsible to hospital administration was appointed to review jobs and perform time allocation studies. As a result, unit service supervisors were appointed and functions realigned.

Service supervisors were given complete responsibility for all nonnursing functions and an extensive orientation program. On-the-job training was provided. The starting pay was comparable to that of a staff nurse. From 8 to 9 months were required for satisfactory functioning of the individuals.

Head nurses' functions included assignments of personnel, teaching, evaluation, and coordination of other direct patient care activities. Staff nurses were responsible for giving and supervising patient care and for aide patient care activities. Maids were responsible for cleaning units, were available all day and, in some instances, were responsible for the transportation of patients.

The unit service supervisor was responsible for providing and checking supplies for nursing. A file was maintained and an inventory taken twice a week. Linen closets were checked three times a week. Service supervisors inventoried their stockroom once a week and replenished it from central stores.

Clerks handled medical records and receipts, made appointments for patients, maintained census records, checked and sent specimens to the laboratory, block charted, transcribed doctors' orders, filed charts, acted as receptionists, and assisted in admissions, transfers, and discharges. They also ordered special equipment and pharmacy supplies. Nurses' signatures were required to check transscribed doctors' orders.

Unit supervisors were responsible for maids and porters on the units. Building services were responsible for housekeeping in nonpatient areas.

Central service was given increased responsibility and was directly responsible to administration. No nursing personnel were on the staff.

Pharmacy used the total stock system of dispensing and maintained the agreed upon inventory of the nursing station. It was checked two or three times a week. Punchcards issued once a month provided a medication record in the kardex. A 3-day charting system was maintained for patients. Totals were sent to accounting on an IBM card and filed for from 6 months to 1 year. It was suggested that decentralization of the pharmacy and use of strip packaging with the use of computers might provide a better system. More detailed descriptions of procedures used are provided in the article.

Conclusions.—The changes brought about by the unit management system were described by the author as enthusiastically received by the various levels of nurses and physicians. Supervisory level nurses were freed to spend more time with the patients and devote more time to teaching and supervision of staff. They were also accessible to assist the physician.

Implementation of this program is described as slow and requiring the participation of everyone to the maximum in establishing each new program. Personnel were required to relinquish duties previously performed and new skills had to be developed so that they could carry out their new assignments. These changes required education programs and the establishment of new policies. The above factors are described as presenting the greatest problems. The need for nurses in further unit management research is emphasized.

Critique

The concept of employing nonnursing personnel to take over the nonnursing functions assumed by nurses is not a new one. The many research efforts directed in the assessment of nursing activities have recommended reallocation of nonnursing functions for improved nursing personnel utilization and improved economy.

The staff utilization research study briefly described in this article arose following the identification of many problems related to nursing staff shortage. The study was carried out by an industrial engineering group. Personnel activities were classified: (a) unit management, (b) outpatient, (c) dietary, and (d) inservice. Categories are not defined and other aspects of the study not included.

The body of the article is devoted to corrective procedures instituted as the result of the study findings. The innovative feature was the employment of the unit service supervisor who was given complete responsibility for all nonnursing functions. Additional clerical functions normally carried out by the nurse were delegated to clerks under the supervision of the nurse. Changes in the responsibilities or the pharmacy and dietary services were described.

The success of the program was based on the enthusiasm expressed by the nurses and physicians for the program. There was no attempt to assess quality of care though it was assumed that improved quality resulted from increased time provided the nurse. This is not necessarily true.

The research study design cannot be evaluated due to lack of information nor are any aspects of the study reproducible though suggestions for change are available. The value of the study lies in the description of the corrective procedures instituted to relieve nursing personnel of nonnursing functions, and it should prove informative and interesting to nursing administrators.

D43. Walker, Virginia H., and Hawkins, James L. "Management: A Factor in Clinical Nursing." ***Nursing Outlook,*** **Vol. 13, No. 2 (February 1965), 57–58.**

Review

The rationale for training nurses in management skills and leadership techniques is presented. It presents the traditional role of the nurse and her numerous responsibilities in the hospital that she has learned to handle by trial and error. The trend to remove such responsibilities as dietary, housekeeping, and ward management and place the nurse at the bedside, Walker and Hawkins point out, has not reduced the need for nurses to be trained in management skills. The many diverse opinions existing as to what the functions of the nurse should be are reviewed. These include opinions that she maintain a variety of levels of managerial responsibility that cannot be eliminated from her role.

The authors are concerned with the fact that management skills are needed in the curriculums of nursing programs. Existent programs, they state, are "oriented toward further understanding of the individual patient with little or no accent on application of such knowledge to develop the art of management." The authors refer to the Surgeon General's Report on Nursing, which indicates that if all nurses are required to do bedside nursing an insufficient number would remain to determine patients' needs and to supervise auxiliary personnel in providing patient care. The authors' concerns are for the management of the patient, which requires skills in planning, organizing, directing, controlling, coordinating, and evaluating.

The concept that the physician is head of the health team is regarded by the authors as a misconception for, they state, he provides little in the way of management of patient care after diagnosing and prescribing for the patient, nor is he educated in the needed leadership skills. The authors state that professional nurses have been and will continue to be the managers of direct, clinical, bedside care and unless drastic changes in the role of the nurse (an analogous role to that of the doctor) should develop, they will continue in their leadership role. It is Walker's and Hawkin's premise that some patients will continue to receive total patient care from the professional nurse, and many will receive care through others under the direction of the professional nurse.

The authors recommend that courses in management skills be taught to students by faculty prepared in administration, either as part of their undergraduate program or as part of a postgraduate internship, if the nurse is expected to work effectively in the modern hospital.

Critique

This article presents a discourse on the educational needs of the professional nurse in the areas of management and leadership skills. The authors contend that the application of management and leadership skills is inherent in the role of the nurse, for the skills are essential in the management of the patients and their bedside care as well as in the management of the auxiliary personnel who provide patient care through the nurse. The authors recommend that courses in leadership and management skills be provided in the educational programs of the professional nurse.

This is not a research study, but it is an article presenting the opinions of the authors based on their own observations and experiences, therefore it makes no contribution to nurse staffing design. The question discussed in this article has long been considered by nurse educators and should be of interest to them as the opinions expressed by two colleagues.

D44. Wolfe, Harvey. "Can Nonnurses Make Qualitative Observations of Nursing Care?" *Nursing Outlook*, Vol. 13, No. 2 (February 1965), 52–53.

Review

Purpose.—To design an experiment to determine whether a nonnurse was able to recognize and record the details of nursing care with the same accuracy and thoroughness as a nurse.

Sample.—A nursing unit housing inpatients in internal medicine was selected. This unit had been used for many research studies in the past. The comprehensiveness of the patient care required on this unit necessitated frequent interaction between nurse and patient. The nursing personnel on the unit were oriented to the purpose and method of the study.

Patients were chosen on the advice of the charge nurse to assure that the observers would have ample care data.

Two registered nurses and two nonnurses were used for observers. The nurses were currently engaged in research and administration but had extensive experience in providing patient care. The nonnurses were fourth year students in the Department of Operations Research and Industrial Engineering at Johns Hopkins University and had experience conducting time studies and work sampling studies on a nursing unit.

Procedure.—The observers reviewed all written material about the patient's progress. The observers, dressed in white laboratory coats, were introduced to the patient as observers and were stationed near the foot of the bed. Once the nurse entered the room there was no communication between observers. They noted all care that took place, recorded as much conversation as possible, and described the condition of the unit.

"Fifteen, 2½ hour, observation periods were selected, including both morning and afternoon sessions." Each set of observations was edited to change technical words or expressions. Key words that may identify the observer were removed. Transcripts were typed, randomizing observations.

"A panel of 19 nursing educators, nursing service administrators, and hospital administrators, was assembled and orientated to the purpose of the study." Each panel was mailed one of the 15 sets of transcripts with a biographical sketch of the patient and his medical record. The judges were permitted as much time as they needed. As soon as a set of transcripts was returned, another set was sent to the panel.

Findings.—The separate judgments expected were 285, but several persons were unable to complete the set of 15. "The final tabulation showed 236 judgments, 179 of which indicated that more information was contained in the transcript written by the nurse."

It was found that there was no tendency to select the first or second transcript with any regularity.

"While no differences existed between the decisions of nurse educators, nursing service administrators, and those holding dual appointments, these groups consistently chose the nurses' observations significantly more often than did the hospital administrators."

This study demonstrates that attempts to substitute a nonnurse for a nurse in observing nursing care are of little value if the observers are to be used as a basis for judging *quality*.

Critique

The research efforts instituted in the field of nursing by outside disciplines have caused concern for nurses, particularly nurses in research. Most often attempts to assess quality of nursing care are omitted. Where attempts have been made, the validity was questioned. In this article a research study is described comparing the judgments of nurses and nonnurses in their relative abilities to measure quality of nursing care. This article is highly relevant to the purpose of this study.

The purpose of the study was to determine whether a nonnurse was able to recognize and record details of nursing care with the same accuracy and thoroughness as a nurse. Findings were rated superior, equivalent, or inferior. It was assumed that nurse educators or administrators were qualified to recognize and discriminate various levels of care quality.

Rationale for the study is sound. However, neither a literature review nor a bibliography is included.

The survey methodology was employed and the observer recorder technique applied in the collection of data. These are briefly described. The sample of observations is small and the number of observers to be compared is too small to be significant. The observers are described. The panel of judges is briefly described as including nursing educators and nursing service administrators. Recorded observations are edited to reduce bias. This is only briefly described and the validity of this procedure questionable.

Insufficient information is provided to evaluate this research effort accurately. However, several deficiencies are evident. Although we consider highly qualified nursing personnel as our best judges of nursing care quality, we cannot assume that they are totally infallible, for individual differences do exist. The sample of observers' recordings that was compared is a small one on which to base judgments but would provide indications for further study. To assume that hospital administrators would more readily accept the recording of the nonnurse is an assumption and would require investigation to prove is scientifically sound. The study problem is innovative and provides an area for further research study. This article, because of its limitations, makes no contribution to nurse staffing design, but it is highly suggestive of ideas for exploration.

D45. Wolfe, Harvey, and Young, John P. "Staffing the Nursing Unit, Part I: Controlled Variable Staffing." *Nursing Research*, Vol. 14, No. 3 (Summer 1965), 236–243.

Review

A most difficult task is to allocate resources and services effectively to meet rapid daily changes in the demand for care.

Studies by Flagle, Balintfy and Flagle, the Commission on Hospital Care 1946, and Blumberg and Baily are based on the assumption of a Poisson distributed occupancy pattern with a variance as large as the means and Poisson distributed admission and discharge patterns. In the face of such variability and uncertainty, the traditional approach to allocating nursing staff has been to provide enough nursing personnel to cover the major portion of the maximum bed occupancy. The commonly used ratio of 3.5 nursing hours per patient day is based on patient census alone, resulting in high personnel levels. The amount of care required is not determined merely by the number of patients in the unit but is the aggregate load on the nursing staff, which is the statistically measured sum of the direct and indirect care needs of each patient.

An observer sat at the patient's bedside and recorded in detail all of the direct nursing care performed. The kind of care (bathing, feeding, etc.), the time of day, the duration of care, and by whom care was given were included in the data. Ninety-six adult patients were selected from typical units. The patients were chosen with the assistance of nursing service to provide the full range of patient conditions. The results show that patients (regardless of condition) received on an average less than 2 minutes of direct bedside care from 12 midnight to 6 a.m. The amount of direct care given between 6 a.m. and midnight was highly dependent on the degree of illness of the patient. The "degree of illness" is reflected by a patient's degree of self-sufficiency.

Nursing services cooperated in identifying those factors that indicate self-sufficiency. These factors were grouped into combinations to form the self-care, partial care, and total care categories. Data collected on the patient categories and the amount of direct care provided showed that the amount of care for total care patients varied from 50 minutes to 220 minutes. On an average, self-care patients required ½ hour of direct care; partial care patients required 1 hour of direct care; and total care patients required 2½ hours of care. An index, derived from these care times, is expressed in a formula that determines the total amount of direct care needed in a nursing unit. The variation in the index is not the same as the variation in the census, in either magnitude or direction. Adjustments are made in the index for those few patients whose condition does change.

With the cooperation and guidance of nursing staff, nursing activities were subdivided into eight major groupings designated as direct patient care, indirect patient care, paperwork, communication, escorting and errors, cleanup, travel, nonproductive, and personal. All nursing personnel on four relatively homogeneous floors of the medical service were observed for 2 months. The work sampling data were analyzed to determine the percentage of nursing time spent in each of the eight activity groups. In comparing the amounts of time devoted to direct care and other activities, a typical 24- to 30-bed nursing unit required 20 hours for indirect care, administrative duties, and other duties for an 8-hour shift. This was true regardless of the number of patients, their classification, or the number of personnel assigned. The amount of time required for direct patient care varied with the index. Therefore, a formula was developed that represents total productive activity in hours as the sum of the index (total direct care) and 20 hours. The 20 hours apply only at the Johns Hopkins Hospital and is used only for adult patients.

Controlled variable staffing is a procedure which presupposes that the total staff on each nursing unit is variable, according to needs, but that control is maintained over the amount of supplementary staff assigned to each unit. The control is based on the index and productive activity computations. This procedure is initiated by the ward clerks, initiating a classification form with patient's name, age, sex, and other identifying information before 2:30 p.m. The charge nurse provides a description of the patient by checking the appropriate column. The supervisor determines the patient classification of each patient according to the three category classification system and computes the index for each floor. The total load is computed using the Productive Activity Equation: the actual nursing hours scheduled for the following day are entered and the hour load is subtracted from the hours scheduled. This result shows additional personnel needed or a surplus present.

Based on these computations, the assistant director of nursing for a given service is able to anticipate the expected load on each floor. More objective adjustments can be made from this quantitative information. Staff may be shifted or a basic staff with supplementary pool may be established. Fewer persons are needed since staffing is made according to patient need. Depending on the kinds of patients, a considerable amount of variation can occur. The actual assignment of personnel from high load floors and the removal from low load floors must still be based on the experience and judgment of the nursing supervisor. Assignments and adjustments must be made on a relative basis with no change necessary for shortages or surpluses of less than 4 hours. Neither the index or the load figures take into account the quality and skill of the nursing effort to be allocated. The supervisor must match various skills and capabilities with specific tasks for patients in each of the three categories.

Critique

The report of the research study presented in this article involves one of the major studies conducted on the assessment of staffing requirements at Johns Hopkins University. Many of the techniques, categories, etc., are totally or partially replications of research studies conducted at Johns Hopkins. The search for an effective staffing method has provided nursing with one of the major areas for study. This article is highly relevant to the problems of nurse staffing and the purpose of this project.

The purpose of this study is to determine some numerical figure or index that is able to predict nursing load, based on a realistic evaluation of patient care needs, rather than patient census.

Rationale for the study is well developed and a small but significant literature review is included. A bibliography appears at the end of the study.

The survey methodology is employed. Data were collected by observer recorders. Kind of care, time of day, duration of care, and by whom care was given were included in the data collection. The sample is adequate. Details of the observation procedure are not included.

Basing degree of illness on self-sufficiency, categories are defined and described: I. Self-Care, II. Partial Care, and III. Total Care. Ratings were performed by nursing personnel. A Direct Care Index was derived representing total hours of direct care required; the method is included.

The work sampling technique was employed in the study of the percentages of time nurses devote to various activities. The procedure is briefly described. Areas studied were • direct patient care, • indirect patient care, • paperwork, • communications, • escorting and errands, • cleanup, • travel, and • nonproductive and personal. A standard time for indirect care was developed for Johns Hopkins Hospital as being 20 hours per 8-hour shift for adult patients.

Two reproducible forms are included: a patient classification form and a form for classification of staff needs. Prrocedures for their use are briefly outlined.

This article is well written and readily understandable. The authors do not provide sufficient information in regard to research methods and techniques to evaluate its research potential adequately. However, the authors refer the reader to the base study for this information. Quality of nursing care provided is assumed, based on the fact that it is provided by nursing personnel. This places limitations on the value of the study. The approach, techniques, and findings should be of value to nursing research for they provide fertile areas for study. Methods developed for the assessment of staffing requirements should prove interesting and useful for nursing administrative personnel.

D46. Wolfe, Harvey, and Young, John P. "Staffing the Nursing Unit, Part II: The Multiple Assignment Technique." *Nursing Research*, Vol. 14, No. 4 (Fall 1965), 299–303.

Review

The conceptualization of a nursing unit as a system in which a number of tasks must be accomplished by a staff of individuals with different qualifications and skills permits the application of an allocation technique called "linear programing." Specific allocations within nursing units depend on the evaluation of the cost and utility interactions between personnel and tasks. These interactions indicate standards of care specified by the hospital and take into consideration differences among nursing levels in education, experience, training, and qualitative benefits to the patients. The primary objective in utilizing linear programing techniques (a multiple assignment model) is to cope with the stochastic nature of patients' demands by varying the daily staffing patterns to match the fluctuating needs. Linear programing affords a supplementary technique to control variable staffing for obtaining a solution to staffing needs that reflect qualitative and quantitative aspects of specific assignments of personnel.

A greatly simplified example of a multiple assignment model is presented in a table in this article. Sixteen "task complexes" were derived by appropriately circumscribing groups of individuals and somewhat independent tasks into easily measurable entities. Any attempt to specify tasks more precisely added little additional information of value, reduced flexibility in making assignments, and made computational costs unreasonable. The list of task complexes shown in this article was drawn up with the assistance of the Johns Hopkins Hospital nursing staff. The categories are mutually exclusive and any task performed by any of the six classifications of nursing personnel will fall in one or another of these categories. The major task complexes are as follows: Technical Tasks No. 1; Technical Tasks No. 2; Evaluation of Patient Needs and Assignment; Supervising and Teaching; Preparatory Care No. 1; Preparatory Care No. 2; Clerical Tasks 1; Clerical Tasks 2; Clerical Tasks 3; Housekeeping Duties; Escorting and Emergency Errands; and Maintenance, Checking, and Ordering of Supplies and Equipment. An example of the description presented for one group follows: Technical Tasks No. 1 includes all nursing procedures that can be performed with on-the-job training. Such procedures are admission, isolation, personal care, application of heat and cold therapeutic procedures, use of equipment for patient comfort, assisting with diagnostic procedures, observing patients for obvious changes, and assisting in the care of the dead. These technical tasks are further broken down according to the classification of the patient.

Specific task complexes are distinguished by the nature of the individual tasks or by their requirement for certain levels of training. The six classifications of nursing personnel are the head nurse, assistant head nurse, general staff nurse, licensed practical nurse, male and female nursing aides, and the ward clerks. Some of the task complex demands are independent of the number of individuals in each of the patient classifications, whereas demands based on other task complexes depend upon one or more patient classifications. Through work sampling procedures, the number of nursing hours needed for each task complex for an 8-hour day is determined.

For every combination of task complex and classification of personnel there is an associated value or cost. Cost is composed of salary cost and a value cost or disutility. Salary cost represents the difference in education, experience, and technical competency among various levels of personnel. The value cost is a measure of the loss or disutility incurred through personnel assignments not entirely acceptable to the medical or nursing professions or to the public. The value cost, in dollars, for each combination of task complex and personnel classification was obtained by using a subjective estimation technique determined by 10 persons with nursing backgrounds or hospital administration experience. The group of five nurses with positions in nursing education or assistant directors and above did not differ significantly with the five hospital administration individuals in their association of a dollar cost with the value of nursing personnel performing a specific task. The final estimate of value costs was obtained by pooling the two rating groups.

All that is necessary for computer utilization is the appropriate specification of basic parameters. The computer solution to staffing for a patient classification mix of 12 self-care patients, 11 partial care patients, and three total care patients is two head nurses, two licensed practical nurses, four aides, and one ward clerk. This phenomenon reflects the concensus of administrator and nurse who, by the value they placed on the qualitative cost of each classification of personnel, demanded that certain tasks be carried out only by very experienced, highly qualified, professional nurses (two head nurses). All other tasks can adequately be accomplished by an auxiliary staff of two advanced technicians, nursing aides, and a ward clerk. These results utilized value judgments of nurses and administrators familiar with particular qualifications at Johns Hopkins.

If there are enough personnel quantitatively, but not of the recommended categories, it is the responsibility of the assistant director of nursing to make substitutions using personnel with qualifications approximating as closely as possible those of the classification model. When not enough personnel are available, the assistant director must allocate individuals in the higher qualitative levels first. Because of the low marginal cost of nursing student labor, students may be economically substituted for any personnel category recommended by the multiple assignment model as long as their qualifications are equal to or greater than those required.

Implementation of the multiple assignment techniques requires the same basic information that is used in the present load computation (patient condition profile and the number of patients in each patient classification system). In addition to the staffing requirements, the program provides estimates of the amount of time necessary to meet patients' needs for each task complex and the personnel that can best perform it.

Critique

Part I of Wolfe's and Young's study on staffing requirements was concerned with the number of nursing personnel (variable staff) required for the daily staffing of a unit. However, if staff was to be appropriately utilized in light of the nursing shortage and rising hospital costs, it was necessary to assign the appropriate level of staff required to carry out the various nursing activities. In this article, Wolfe and Young described a method developed for the assignment of staff according to level.

This article presents a multiple assignment model. Its primary objective is to cope with the stochastic nature of patients' demands by varying the daily staffing patterns to match the fluctuating needs.

The procedure involved the identification of task complexes. These are based on the extent of education, training, and experience required to perform a specific level of task. Categories or complexes are defined. Categories are easily distinguishable and mutually enclusive so that any level of nursing personnel tasks will fall into one of the categories. The work sampling procedure was applied in determining the nursing hours needed for each task complex for an 8-hour day. The assessment procedure is not described. Salary cost and value or disutility costs are computed for every combination of a task complex and classification of personnel. A subjective estimation technique was utilized in obtaining the value cost—this procedure is briefly described. Value costs were considered to reflect the qualitative aspects of performance of nursing care. Through the use of the computer, staffing assignment patterns are evolved. The procedure is described in general terms.

This article does not report a research study but describes the development of a multiple assignment model that involved the application of research techniques. The applications of these techniques are only briefly described and for this reason cannot be evaluated. The completed multiple assignment model appears in chart form. It is not reproducible except for its form but would require specific computations in each hospital situation. This article does not include all of the detailed information required for the development of a multiple assignment model. The assumption that value costs reflect qualitative aspects of performance is questionable for it is not always true that individuals perform at the level for which they are prepared.

This is an interesting article and it presents an innovative approach for the determination of staffing levels and staffing patterns. In many respects it appears to be a rather precise method but, as is often the case, it does not give ample consideration to the human elements involved. Nursing research personnel could well consider this an area for study and nursing administration should find its approach interesting and in many respects valuable.

D47. Yankauer, Ruth, and Levine, Eugene. "The Floor Manager Position—Does It Help the Nursing Unit?" *Nursing Research*, Vol. 3, No. 1 (June 1954), 4–10.

Review

Problem.—To find out differences in the following when the nursing staff is supplemented by (1) clerical personnel or (2) floor managers: • amount of time spent on patient care management vs. unit management and activities, • time the nursing staff spends on nonnursing activities, and • time the nursing staff spent with patients.

Premises.—A. There are two major areas of activity in managing the head nurse unit: • management of patient care, and • management of unit activities.

B. The employment of auxiliary personnel had not provided sufficient release of the nurse from nonnursing duties.

C. The floor manager, directly responsible to hospital administration, can successfully manage unit activities relieving the nurses of nonnursing functions for management of patient care, thereby relieving the nurse shortage.

The study was carried out on one ward of a moderate sized metropolitan hospital (kind not designated) in 1950. The plan was a collaborated effort of nursing administration and hospital administration. A nonnurse floor manager directly responsible to hospital administration and the floor nurse supervisor working full time established the floor manager's position to take over all nonnursing activities. Together they established a procedure for ordering and packaging supplies, developed supervisory responsibilities for housekeeping duties, and set the appropriate working hours for the floor manager position. The manager was assigned to supervision and training of other managers engaged in these activities. Sufficient personnel from the ward were reassigned to the manager to carry out unit management activities.

Method.—The work sampling method was employed. An observer recorded the activities of each person on the unit every 20 minutes. In Phase I, data were collected for 7 days (October 29–November 4, 1952), from 7 a.m. until 11 p.m. The clerk was on duty for 40 hours during the week; 1,624 observations were made. In Phase II, data were collected for 8 days (March 4–10, 1953) and 3 days in May 1953. The floor manager replacing the clerk was on duty 90 hours during this period. A total of 2,297 observations were made. Days of the week are not specified for either phase.

Analysis of results.—Results were machine tabulated and presented in tables. Raw data are presented. Numbers of observations by types of personnel and the phase of the study are given. Changes in activities between Phase I and Phase II are grouped into two categories: changes in levels of activities and changes in areas. Time distribution of activities of various personnel according to levels for the two phases is shown in number of hours and percentages. An additional 18 percent of the head nurse's time was spent on her own activities during Phase I as was 4 percent of the staff nurse's time and 5 percent of the nurse helper's time. During Phase I, the clerk spent 38 percent of her time in floor managerial duties. The floor manager's time was divided equally between clerical and floor managerial duties in Phase II.

Changes in areas of activities studied showed the head nurse's time in staff development increased from 5 percent to 10 percent in Phase II. Professional staff nurses spent more time in activities with the patient in Phase I than in Phase II, but more time was spent in indirect patient care such as communication, health teaching, social and psychological care. In Phase II, nurse helpers spent 10 percent more time in patient care and less in unit management; time spent in housekeeping dropped from 24 percent to 16 percent. All personnel spent more time on their own level of acivities in Phase II.

Conclusions.—It was felt that the floor manager was of most benefit to the head nurse. Because of the cost of extra hours for the manager, it would be most beneficial to have both a clerk and floor manager on the unit. It was recommended that job satisfaction should be studied in the two systems and compared. It was further suggested that personnel "friction areas" in the new system should be studied and that the question, "Would centralization of hospital service, e.g., supply, reduce or increase cost?" be explored.

Critique

Effective utilization of nursing personnel and reassignment of nonnursing functions to relieve the nursing shortage are frequent areas of investigation. The study described in this article is designed to determine what differences exist in activities when the nursing staff is supplemented by clerical personnel as compared to activities of a nursing staff performed when a floor manager is assigned to assume responsibilities previously carried by the head nurse. Differences such as the change in the amount of time spent on patient care management versus unit management and that spent on nonnursing functions as compared to the time spent with patients were considered. The innovative feature lies in placement of the floor manager's responsibility directly to hospital administration.

Insufficient information is provided in the article to adequately assess the contribution of this study to research design. The theoretical framework of the study is not inclusive, though premises are outlined. The work sampling method is employed but only briefly described. A source for this information is cited. The tool used in collection of the data is not included or described and the orientation of observers not discussed.

The sample is small. It is limited to 15 days of observation on one floor of a moderately sized metropolitan hospital.

Two important factors are not considered in the study: personnel satisfaction and cost. Quality of care is assumed by the amount of time the various levels of nursing personnel spend in providing patient care.

This article suggests one way of solving the nurse shortage problem and for that reason may be of interest to nursing administrators.

D48. Yett, Donald E. "The Chronic 'Shortage' of Nurses: A Public Policy Dilemma." ***Empirical Studies in Health Economics,*** **Johns Hopkins University Press, 1970, 357–397.**

Review

This article includes one attempt to specify what the term "nurse shortage" means. This shortage is examined in the light of experts' agreement that there is a large increase in the supply of nurses but a greater increase in the Nation's needs for nurses.

When the amount of something demanded by the public exceeds the amount supplied at the existing market price, an economic shortage exists. A critical summary of different economic models is presented.

The Blank-Stigler model specifies that a shortage exists when the number of workers available increases less rapidly than the number demanded of the salaries paid in the recent past. Data on median nurse salaries relative to these few other workers suggest a shortage of nurses during World War II but no postwar shortage. Between 1962 and 1966, there was evidence of an economic shortage according to the relative wage increase criterion. The fairly steady increase in the ratio of practical nurses and nonprofessional nursing personnel to hospital employed registered nurses indicates personnel substitution during the 1950's, at which time other data indicate a surplus. The decline of nurse salaries in comparison to all workers, yet increased relative to nonprofessional, indicates a surplus but encourages substitution. Blank and Stigler indicate that no "excess demand" would occur unless wages were prevented from rising. Whether there will be a "significant" shortage will depend upon the difference between supply and demand at the previous wage and upon the speed at which employer expectations are brought into line with changed market realities.

The Arrow-Capron model is dynamic; i.e., recognizes time lags in response to demand or supply shifts. A shortage is the excess of demand over supply at the prevailing market wage. Demand means the amount of labor that would be hired in a particular labor market in equilibrium at the prevailing wage. After complete rational calculation of the alternatives, the Arrow-Capron definition, as does the Blank and Stigler definition, fails to measure the size of the shortage and the difference between behavior under conditions of imperfect and of perfect knowledge.

A dynamic shortage can be measured at any time by reported job vacancies, which depend upon the rate of increases in demand, the slopes of the short-run market supply and demand curves, and the market reaction speed. Before the dynamic shortage can be tested, the equilibrium vacancy level of the market must be determined.

Given two assumptions of market imperfection and profit maximization, a larger number of reported vacancies may be perfectly consistent with the equilibrium in the labor market. Equilibrium nurse vacancies may represent a misallocation of resources and are not likely to be corrected by normal market forces.

Nursing statistics should be viewed as weighted averages behavior in local markets that possess a high degree of autonomy because of low wage-induced geographical mobility and the specific nature of nurse services. Hospitals normally report registered nurse vacancies at the going wage, indicating a shortage only in welfare theory terms. However, the misallocation of resources is not what nursing authorities mean when they complain about the shortage. When demand increases rapidly, salaries do not rise as much as they do in a competitive market and the smaller the increase in registered nurse salaries, the less the increase in the rate of return or training will be. Because the sizes of two types of shortages cannot be currently estimated, remedial policies cannot be implemented. Both types of shortages involve resource misallocation. The question is whether they respond to the same or to different policy measures.

Policy implications.—The effects of alternative policies on both economic and "needs" shortages are given in a table summarizing the effect on vacancies. The only policy that reduces all vacancies simultaneously is an increase in the elasticity of supply. Any policy to decrease demand reduces all except "needs" vacancies, usually by substituting less skilled personnel for registered nurses. Hospitals have done little to implement any proposal that might involve higher costs. The effect of collective bargaining is indeterminate because other hospitals may offer higher salaries to forestall the spread of collective bargaining. Professional registries are a potentially effective instrument for raising nursing salaries. A nationwide nurse registry would greatly improve the flow of information. Subsidies paid to hospitals would be an incentive for them to hire enough nurses to eliminate vacancies.

Given the structure of the nurse market and the continued increases in demand relative to supply, equilibrium and dynamic vacancies are likely permanent phenomena. It is doubtful that economists would pay much attention to them if there were no longer a shortage of nurses in the popular sense of the word.

Critique

The shortage of nurses has provided a basic premise for many of the research studies instituted in nursing. Considerable speculation has arisen in regard to the shortage of nurses. Some investigators have concluded that a shortage of nurses does not exist and the problem is a maldistribution of nurses rather than a shortage. The general opinion held and expressed by experts in the field of nursing administration is that a shortage does exist though the number of nurses available has increased. There has been a far greater increase in the need for nurses. This question is highly relevant to the problems of staffing and consequently to this project.

In this article, Yett attempts to define what the term "nurse shortage" means and contends that an economic shortage exists when the amount of something demanded by the public exceeds the amount supplied at the existing market price. Critical summaries of the Blank-Stigler and the Arrow-Capron economic models are presented in the author's discussion of the nurse shortage. The two models are discussed and the author contends that both models fail to measure the size of the shortage and the differences between behavior under conditions of imperfect and perfect knowledge. The characteristics of the nurse shortage are discussed and problems in correction identified. The dynamic shortage, he states, can be measured at any time through reported job vacancies. However, equilibrium nurse vacancies may represent misallocation of resources. The author states that the two types of shortages cannot be currently estimated so remedial policies cannot be implemented.

This article, though difficult to read, does outline a number of relevant factors that contribute to the nursing shortage. Difficulties in the assessment of the shortage are described and suggestions for reducing the shortage are denfied. This is not a report of a research study and cannot be assessed as such. It makes no contribution to nurse staffing design in that it describes a highly relevant variable, nurse supply.

Glossary

The glossary of terms has been drawn from several sources. At the close of each definition, symbols and numbers are given to designate the source and page reference. A list of the references and symbols used for each follows:

(A&L)	Abdellah, Faye G., and Levine, Eugene. *Better Patient Care Through Nursing Research*. New York: Macmillan Company, 1965.
(A)	Ebel, Robert. "Appendix Glossary of Terms Used in Educational Measurement." *Measuring Educational Achievement*. Englewood Cliffs, New Jersey: Prentice-Hall, 1965.
(AAA)	Lysaught, Jerome P. *An Abstract for Action*. New York: McGraw-Hill Book Company, Inc., 1970.
(B)	Banathy, Bella H. *Instructional Systems*. Palo Alto, California: Fearon Publishers, 1968.
(Bar)	Barnes, Ralph M. *Work Sampling*. 2nd Edition. New York: John Wiley and Sons, 1957.
(G)	Gould, Julius, and Kolb, William L. *A Dictionary of the Social Sciences*. Free Press of Glencoe, United States of America, 1964.
(H)	Henderson, Virginia. *The Nature of Nursing*. New York: Macmillan Company, 1966.
(Hi)	Hillier, Frederick S., and Lieberman, Jerald. *Introduction to Operations Research*. San Francisco: Holden-Day, Inc., 1967.
(K)	Aydelotte, Myrtle K., and Tener, Marie. *An Investigation of the Relation Between Nursing Activity and Patient Welfare*. Final Research Report (GN 4786 and GN 8570), State University of Iowa, 1960.
(Ki)	King, Paul F. "Personnel Utilization In Hospital Medical Surgical Units." Unpublished Master's Thesis, George Washington University, Washington, D.C., 1967, 5–8.
(L)	Letter to Marie R. Kennedy from Myrtle K. Aydelotte, dated July 19, 1971.
(NA)	National Academy of Sciences. "New Members of the Physician's Health Team: Physician's Assistants." Report of the Ad Hoc Panel on New Members of the Physician's Health Team to the Board of Medicine of the National Academy of Sciences, 1970.
(Op)	Optner, Stanford L. *Systems Analysis for Business and Industrial Problem Solving*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965.
(OO)	U.S. Department of Labor Statistics. *Occupational Outlook Handbook*. Bulletin No. 1650, 1970–71 edition, Washington, D.C.: U.S. Government Printing Office.
(P)	Price, Elimina M. *Staffing for Patient Care*. New York: Springer Publishing Co. Inc., 1970.
(PL)	Public Law 89–97, 89th Congress, H.R. 6675, July 30, 1965.
(Te)	*Test Service Notebook*. No. 13, issued by the Test Department, Tarrytown, New York: Harcourt, Brace, and World, Inc., (no date).
(Theo)	Theodorson, George, and Theodorson, Achilles. *Modern Dictionary of Sociology*. Apollo Editions, New York: Thomas T. Crowell Company, 1969.
(USPHS #370)	U.S. Department of Health, Education, and Welfare; Public Health Service

	Publication No. 370. *How to Study Nursing Activities in a Patient Unit.* Washington, D.C.: U.S. Government Printing Office.
(DOT)	U.S. Department of Labor. *Dictionary of Occupational Titles.* Vol. 1, 3rd edition, Washington, D.C.: U.S. Government Printing Office, 1965.
(Wa)	Wandelt, Mabel. *Guide for the Beginning Researcher.* New York: Appleton-Century Crofts, Inc., 1970.
(W)	*Webster's Seventh New Collegiate Dictionary.* Springfield, Massachusetts: G. and C. Merriam Company, 1965.
(We)	Weeks, Lewis. *Progressive Patient Care, An Anthology.* University of Michigan, Bureau of Hospital Administration, 1964.

The terms have been divided into two categories entitled "Research Terms" and "Health Care and General Terms." Research terms have been subdivided under the headings "General Research Terms" and "Operational Research Terms." The terms have been arranged alphabetically within the categories.

Research Terms

General Research Terms

Abstraction.—"An intellectual process using selective perception to reach generalizations. In the process of abstraction, perception is focused on a certain aspect of reality. This aspect or element is selected from a variety of perceived phenomena and, through the use of symbols, is analyzed and stated in terms of generalizations that are derived from some of the concrete contexts in which the element occurs and are assumed to be applicable to all similar cases while not completely descriptive of any one of them. Through abstraction, common elements may be seen in a wide variety of objects and events, thus facilitating classification and analysis." (Theo, p. 3)

Analysis of Variance.—"A statistical test of significance of the results of a study in which the effects on the dependent variable of more than two alternatives of an independent variable (or more than one independent variable) are being tested simultaneously. In testing multiple independent variables, this procedure can provide valuable information on the effects of not only each independent variable but also of combinations of these variables. In the test of significance the F-test is employed. Analysis of variance is the analytical method for treating data obtained from such experimental designs as the latin square and the factorial." (A&L, p. 698)

Arithmetic Mean.—"The sum of a set of scores divided by the number of scores (commonly called average, mean.)" (Te, p. 1)

Average.—". . . is a number, not always the actual score, which represents the more typical or representative value in a group of scores. 'Average' is a generic term designating any measure of a central tendency, such as the mean, median, or mode. In ordinary speech, the term 'average' often means the same thing as the term 'arithmetic mean.'" (A, p. 446)

Average Standard.—Determined from "actual time studies taken over a period to determine the standard time. . . . The individual times are averaged, which results in the average standard. . . ." (Bar, p. 140)

Axiom.—"A statement whose truth is either self-evident or so well established that it is unquestioned and universally accepted within a scientific discipline, or a statement true by definition (or assumption) within a logical system and used to derive other propositions." (Theo, p. 25)

Bias.—"1. Systematic distortion occurring in the course of research which influences the outcome of the research, increasing the likelihood of one outcome rather than another. It may have its source in the selection of the sample to be studied, in the wording of the questions used in the study, in the appearance, attitudes, or methods of the interviewers, or in the analysis of the data." (Theo, p. 29)

Bimodal Distribution.—" . . . the measures tend to concentrate or pile up at two distinct points or regions along the score scale. The frequency distribution curve for a bimodal distribution has two pronounced humps or peaks, though these may not be of the same height." (A, p. 446)

Category.—"1. A concept used for the purpose of classification. 2. In statistics, a subdivision of a variable used in classifying data. Usually the term is limited to the subdivisions of a qualitative variable, although sometimes it is also used to refer to the class intervals of a quantitative variable." (Theo, p. 39)

Central Limit Theorem.—"A statistical theorem stating that the SAMPLING DISTRIBUTION of a mean approaches the normal distribution as the number of random samples becomes very large, even if the values that comprise the sample means and the population from which the random samples are drawn do not form a normal distribution." (Theo, p. 41)

Central Tendency, Measure of.—"Any of various statistical measures used to obtain a single number that is considered the most representative value of a series of data. Commonly referred to as an AVERAGE, this number is the central point in the frequency distribution of a single variable about which the other values are distributed. The center of the distribution may vary according to the particular measure of central tendency use—the MEAN, MEDIAN, or MODE." (Theo, p. 42)

Chance Factors.—"Varied and unknown factors, regarded as irrelevant to a given study, that influence the outcome of the study to some extent, but not in a way of degree considered significant. It is never possible to control or even know all the factors that may influence a given outcome. Thus, for example, it is not possible to have a SAMPLE that is perfectly representative of the POPULATION from which it was drawn, nor is it usually possible to know precisely all of the minute ways in which the sample differs from the population. Therefore, if a random sample of a population is measured in a certain way, the measurement obtained will not be exactly the same as if the entire population had been measured, nor will two random samples from the same population yield precisely the same measurement. These variations among samples or between a sample and a population, if they are small, are considered insignificant." (Theo, p. 43)

Chi-Square Test.—"A non-parametric statistical test of significance based on the chi-square distribution. It can be used to analyze the significance of differences among groups that are being compared in terms of qualitative variables. The data, called frequency distributions, consist of counts of the number of study subjects in each group found to possess each of the scale values of the variables measured. The test is performed by calculating theoretical frequencies for each scale value (i.e., for each cell of the table into which the frequencies are tabulated), subtracting the theoretical from the actual frequencies, squaring the differences, dividing by the theoretical frequency, and then summing up all the quotients. This sum is the computed value of chi-square for the sample data. The larger the computed value of chi-square, for specified-size samples, the smaller is the probability that the differences in the frequency distributions being compared are due to random sampling." (A&L, p. 699)

Class Interval.—"An arbitrary, convenient subdivision of a quantitative VARIABLE. The total RANGE of the variable is divided into class intervals, preferably equal in size. Both continuous and discrete variables are so divided to facilitate analysis." (Theo, pp. 50–1)

Classification.—"1. The process of arranging data into categories or class intervals to facilitate the comprehension and analysis of the data." (Theo, p. 52)

Coding.—"A research procedure in which the data collected (for example, by questionnaire) are prepared for counting and tabulation by classification and codification. Categories or classes are devised so that each observation (for example, each answer from a questionnaire) will fall into one or another of a predetermined set of categories. The raw data are transferred into symbols (usually numerical) and can then, for example, be transferred to punched cards and be rapidly processed with an electronic computer. Determining the categories to be used in the analysis of data prior to the collection of the data is called processing." (Theo, p. 54)

Coefficient.—"A summarizing measure that provides in one mathematical value information about the relationship between two (or more) variables. The most commonly used coefficient is the COEFFICIENT OF CORRELATION." (Theo, p. 54)

Coefficient of Correlation.—"A measure of the degree of relationship, or 'going-togetherness', between two sets of measures for the same groups of individuals. The correlation coefficient most frequently used in test development and educational research is that known as the *Pearson* (Pearsonian) r, so named for Karl Pearson, originator of the method, or as the *product-moment r,* to denote the mathematical basis of its calculation. Unless otherwise specified, 'correlation' usually means the product-moment correlation coefficient, which ranges from .00, denoting complete absence of relationship, to 1.00, denoting perfect correspondence, and may be either positive or negative." (Te, p. 2)

Comparative Method.—"Generally, the study of different types of groups (large and small) and societies in order to determine analytically the factors that lead to similarities and differences in specified patterns of behavior." (Theo, p. 65)

Concept.—"In general usage the term mainly denotes 'idea' or 'notion'. It is envisioned as an abstract or psychological thing presupposing conscious minds which at least potentially 'have' the concept, i.e., understand it, operate with it, apply it, etc. . . . Defined as an aspect of though, a *concept* is a kind of unit in terms of which one thinks; a unit smaller than a judgment, proposition, or theory, but one which necessarily enters into these. . . . Concepts correspond to or 'are the meaning of' all meaningful words, with certain qualification. . . ." (G, p. 120)

". . . a complex of ideas so united as to portray a large general idea. A concept may be essentially ideational, as the concept of liberty, or it may encompass concrete elements, as the concept of table; both of which involve a complex of ideas in contrast to a single idea (if such a thing as a single idea is possible)." (Wa, pp. 313–4)

"A word or set of words that expresses a general idea concerning the nature of something or the relations between things, often providing a category for the classification of phenomena. Concepts provide a means of ordering the vast diversity of empirical phenomena, are essential in the process of generalizing, and form the basis of language. However, concepts are not inherent in nature itself, waiting to be discovered, as it were. Concepts, including scientific concepts, are mental constructs reflecting a certain point of view and focusing upon certain aspects of phenomena while ignoring others. Therefore, the concepts a person uses have an important effect upon his perceptions of reality. Scientific concepts form a part of scientific THEORY." (Theo, p. 68)

Confidence Interval.—"A measure of the precision with which a sample statistic (summary measure) estimates the parameter of the population from which the sample was randomly selected. Determined from the standard error of the statistic, the confidence interval provides a range within which we estimate that the true value of the population parameter lies at a stated level of probability (confidence coefficient). Thus, for example, the 95 percent confidence interval—the value of the sample statistic ±2 standard errors—tells us that the probability that the interval embraces the true parameter value is 19 to one." (A&L, p. 700)

Construct.—"A concept devised to aid in scientific analysis and generalization. A construct is generally inferred indirectly from observable phenomena. It is an abstraction from reality, selecting and focusing on certain aspects of reality and ignoring others. It is a HEURISTIC ASSUMPTION designed to guide and suggest fruitful areas of investigation; it is not intended as a direct description of concrete phenomena." (Theo, p. 74)

Content Analysis.—"A research technique used to described [*sic*] and analyze objectively, systematically, and quantitatively the content of written, spoken, or pictorial communications such as novels, editorials, movies, comic books, and public speeches. By systematically classifying analytical components of the material being studied, the researcher can identify specific or general themes that were not evident from simple examination and, for example, might be able to judge the kind of impact (either intended or unintended) the material is having upon those exposed to the communication." (Theo, p. 75)

Content Validity.—Determined for an educational achievement test "by the extent to which the items in the test adequately sample the areas of subject matter and the abilities which a course of instruction has aimed to teach." (A, p. 447)

Control Group.—"A *control group* is an educational experiment which is not subject to the experimental treatment but is otherwise as nearly as possible like the experimental group or groups. Tests given to all groups after the experimental treatment are used to indicate the influence of that treatment on the experimental groups." (A, p. 447)

"A group of subjects used as a standard for comparison in an experimental design. The control group is identical in all relevant ways to the EXPERIMENTAL GROUP, except that it is not subjected to the independent variable. . . . The control group serves as a device with which to compare the experimental group in order to make certain that specific reactions or change in the experimental group are the result of the effect of the experimental treatment alone and not some irrelevant, uncontrolled element." (Theo, p. 77)

Control Chart.—". . . enables the analyst to plot the daily or cumulated results of the sampling study." If a plotted point falls outside the control limits, an abnormal condition is present. This unusual occurrence would require the data for that day not be used. (Bar, p. 21)

Correlation.—"Relationship or going-togetherness between two scores of measures; tendency of one score to vary concommitantly with the other, as the tendency of students of high IQ to be above average in reading ability. The existence of a strong relationship—i.e., a high correlation—between two variables does not necessarily indicate that one has any causal influence on the other." (Te, p. 2)

"1. The interrelationship of two (or more) quantitative variables so that an increase in the magnitude of one of the variables is associated with an increase or decrease in the magnitude of the other. Thus when two variables are highly correlated it is possible to predict with reasonable accuracy the magnitude of one VARIABLE from a knowledge of the magnitude of the other. The term 'correlation' usually is not used to refer to the association of two qualitative variables or of a quantitative variable and a qualitative variable. 2. Occasionally the term 'correlation' is used to refer to the interrelationship of any two (or more) variables whether quantitative or qualitative." (Theo, p. 80)

Correlation, Rank Difference.—"A nonparametric statistical test, symbolized by the coefficient rho (ρ), or sometimes r_s, used to measure the CORRELATION between two variables the data of which are in the form of ranks. It is derived from the Pearson product-moment correlation coefficient and is the most widely used correlation for ranked data. It is somewhat easier to compute than the Kendall rank correlation. The rank difference correlation is also known as the Spearman rank correlation. It is linearly related to the KENDALL COEFFICIENT OF CONCORDANCE W." (Theo, p. 83)

Correlation, Tetrachoric.—"A measure of CORRELATION, symbolized by the coefficient tetrachoric r or r_t, between two variables, each of which is expressed in a dichotomy, or two separate categories. The use of the tetrachoric correlation assumes that each variable is truly continuous with a normal distribution that has been constricted into a dichotomy. It was originally suggested by Karl Pearson as an estimate of the product-moment correlation coefficient. Its use is limited to the situation in which a researcher has data only in the form of a 2 x 2 table, but knows that the underlying distribution of the two variables is continuous and normal." (Theo, pp. 83–4)

Counseling.—"The process of using interviews, psychological tests, guidance, and other techniques to help an individual solve his personal problems and plan his future realistically." (Theo, p. 85)

Covariance, Analysis of.—"The extension of the basic technique of the analysis of VARIANCE to the situation in which there are two or more quantitative variables. The COVARIANCE of the quantitative variables is measured for each of the categories of the qualitative variable, and the resulting measure are compared to see if they differ significantly. The categories of the qualitative variable (or variables) may be referred to as separate samples, and thus it may be said that the covariances of two or more quantitative variables in two or more samples are compared to see if there is a statistically significant difference between the samples." (Theo, pp. 85–6)

Criterion.—". . . a standard of judging. In test development it usually refers to a characteristic or a combination of characteristics used as a basis for judging the validity of a test or some other measurement procedure. The criterion for the validity of scores from an aptitude test is usually some measure of academic achievement, perhaps obtained from a good achievement test." (A, p. 448)

Critical Incident.—". . . description of some occurrence involving a person which is taken to indicate unusual competence or lack of competence on his part. The term 'critical incident' has been popularized by John Flanagan and his associates. It has been used by them as a basis for defining job requirements and for developing proficiency tests." (A, p. 448)

Critique.—". . . a critical estimate or discussion." (W, p. 198)

Critical Ratio.—"A parametric test of statistical significance. Critical ratio, often written C.R. and also referred to as the Z measure, is used to judge whether the difference between two statistics (most commonly—but not necessarily—means) obtained from two groups probably represents a true difference between the groups studied or a meaningless difference due to chance. The critical ratio is obtained by dividing the difference between the statistics obtained from the two groups by the STANDARD ERROR of the difference (C.R. $= \frac{D}{\sigma D}$). The larger the size of the critical ratio, the less likely it is that the obtained difference is due to chance." (Theo, p. 89)

Cybernetics.—"The study of communication among men, animals, and machines, with particular emphasis on the FEEDBACK of information and the function of feedback in the process of control. In cybernetics, communication and control are classed together, for as Norbert Wiener, who introduced the term 'cybernetics' in its current usage, explains: 'When I control the actions of another person, I communicate a message to him, and although this message is in the imperative mood, the technique of communication does not differ from that of a message of fact. Furthermore, if my control is to be effective I must take cognizance of any messages from him which may indicate that the order is understood and has been obeyed.' (N. Wiener, *The Human Use of Human Beings,* Doubleday, Garden City, N.Y., 1954). Cybernetics was applied originally in the fields of mathematics, engineering, and electronics, and later was extended to other fields, including, recently, the social sciences. In applying cybernetics to the field of sociology the central thesis is that 'society can only be understood through a study of the messages and the communication facilities which belong to it; and that in the future development of the messages and communication facilities, messages between man and machines, between machines and man, and machine and machine, are destined to play an ever-increasing part.' (Ibid.)" (Theo, p. 101)

Cyclical Movement.—"Repetitious change involving the recurrence of certain conditions or events. The recurrent phases of the cycle may vary in duration. The BUSINESS CYCLE is an example of cyclical movement." (Theo, p. 101)

Data.—"Information collected from observation or measurement from which an attempt is made to develop generalizations or conclusions. When the data are without form or organization they are called raw data." (Theo, p. 102)

Deduction.—"The process of reasoning from general principles to particular instances. Deduction is used in the SCIENTIFIC METHOD when specific hypotheses or particular predictions are derived from broader theoretical principles." (Theo, p. 104)

Degrees of Freedom.—"In statistical calculations, the maximum number of values of a VARIABLE (or variables) that are free to vary under a given set of conditions. For example, when the sum of four values is fixed, only three of the values are open to choice, for after the three are chosen the value of the fourth is determined by the sum. Therefore, there are three degrees of freedom for four values of a variable, and in general the degrees of freedom are one less than the number of values of the variable (N–1). In a CONTINGENCY TABLE the degrees of freedom are one less than the number of rows multiplied by one less than the number of columns, usually written (r-1) (c-1). (Theo, p. 106)

Demography.—"The study of population size, composition, and distribution, and the patterns of change therein. The narrowest conception of demography views it as the study of vital statistics (the study of birth and death rates and related statistics). However, as vital statistics are analyzed and interpreted, demography develops into social demography or population studies. In the broadest view population composition and distribution include not only such variables as fertility, mortality, age and sex, but also marriage, divorce, family size, race, education, illiteracy, unemployment, distribution of wealth, occupational distribution, crime rates, density of population, migration, etc." (Theo, p. 108)

Design.—". . . a preliminary sketch or outline showing the main features of something to be executed." (W, p. 224)

Design of a Work Sampling Study.—Includes the "number of observations to be made . . . the number of observers needed . . . the number of days needed," place for taking the observations and the "design of the observation form or IBM card." (Bar, p. 64)

Deviation.—"The amount by which a score differs from some reference value, such as the mean, the norm, or the score on some other test." (Te, p. 2)

Difficulty Index.—". . . an index of a test item is usually based on the proportion of examinees in a group who answer the test item correctly. The most common index of difficulty is the percent of correct response, though difficulty indices on other scales are sometimes encountered. When percent of correct response is used as the difficulty index, the higher the numerical value of the index, the lower the difficulty of the item." (A, p. 449)

Discrimination Index.—". . . a measure of the extent to which students who are judged to be good in terms of some standard succeed on the item and those who are judged to be poor on the same standard fail it. A commonly used index of discrimination is simply the difference in a proportion of correct response between the group of those scoring in the top 27 percent on the total test and the group scoring in the bottom 27 percent on the same test. Other indices of discrimination are based on the coefficient of correlation between success of the item and total score on the test." (A, p. 449)

Dispersion.—". . . the scatter, variability, or spread of a distribution of scores around some central value such as the mean or median. The terms 'dispersion' and 'variability' are practically synonymous. Dispersion may be measured by the average deviation, the standard deviation, the variance, or the range." (A, p. 449)

Distribution of Scores.—". . . a tabulation or enumeration of the frequency of occurrence of each score in a given set of scores. A distribution of scores may be indicated graphically by a frequency polygon or by a histogram." (A, p. 450)

Duration and Time of Study.—Based on the purpose and conditions present, "The study should be extended over a period of sufficient length to get a representative sample." (Bar, p. 66)

Elements to be Measured.—The element is "carefully defined so there can be no mistake in identifying it. A carefully prepared written definition is desireable." The elements are activities and delay which reflect the purpose of the study. (Bar, p. 65)

Empirical.—"Based on experience, observation, or experimentation." (Theo, p. 130)

". . . appears to denote observations and propositions primarily based on sense experience and/or derived from such experience by methods of inductive logic, including mathematics and statistics. . . . The adjective derives from a Greek word . . . meaning experience, practiced, or acquainted with. . . . J. Dervey has pointed out two basic meanings of that 'ambiguous word', . . . the word 'empirical' is often set in opposition to the rational. . . ." (G, p. 237)

Empirical Generalization.—"An isolated scientific proposition or law. It is a statement of generalized relationship among facts, verified by empirical observation, but not related to other propositions and not part of an integrated THEORY." (Theo, p. 130)

Empirical Test.—"A test of a hypothesis in which the investigator observes the phenomena in question (either under experimental or 'natural' conditions) to determine whether the hypothesis is supported or contradicted by these observations. Ideally, the investigator should be as interested in disproving as in verifying the hypothesis, and should consider all other possible explanations for the observed events. Moreover, the scientific validity of any set of observations depends upon their confirmation by other qualified observers. Any other qualified investigator following the specified procedure should reach the same conclusion about a hypothesis as the original investigator." (Theo, p. 130)

Error, Alpha.—"The rejection of a true null hypothesis. Since null hypotheses are accepted or rejected on the basis of statistical probability, the possibility exists that a true null hypothesis may be erroneously rejected. Generally speaking, in the use of statistical probability to accept and reject null hypotheses, the risk of rejecting a true null hypothesis increases as the risk of accepting a false null hypothesis decreases. The level of significance used indicates the probability of making an alpha error, a higher level indicating a greater chance of this type of error. Alpha error is sometimes referred to as type I error." (Theo, p. 133)

Error, Beta.—"The retaining of a false null hypothesis. Since null hypotheses are accepted or rejected on the basis of tests of statistical probability, the possibility exists that a false null hypothesis may be accepted. The degree of danger of accepting a false null hypothesis depends upon the level of significance used in testing the hypothesis: the lower the level of significance used, the greater the probability of making a beta error. Beta error is sometimes referred to as type II error." (Theo, p. 133)

Error of Measurement.—". . . the difference between an obtained score and the corresponding true score. Any actual test score may be regarded as the sum of a true score and an error of measurement which may be either positive or negative. The median value of the numerical size of the errors of measurement in a particular set of test scores is called the probable error." (A, p. 450)

Error Variance.—". . . is the mean of the squared errors of measurement for each score in the set. The reliability of a set of test scores is sometimes defined as the 'proportion of the total score variance which is not error variance.'" (A, p. 450)

Evaluation.—". . . a judgment of merit, sometimes based solely on measurements such as those provided by test scores but more frequently involving the synthesis of various measurements, critical incidents, subjective impressions, and other kinds of evidence." (A, p. 450)

Experiment.—"An investigation in which there is controlled manipulation by the investigator of the variables being studied, and precise observation or measurement of the results. An experiment involves the intervention of the investigator so that the phenomena under investigation may be observed under controlled conditions. Usually the investigator seeks conditions under which the effects of one variable may be observed while other relevant variables are held constant." (Theo, pp. 138–9)

Experiment, Before-After.—"A type of controlled experiment in which both the EXPERIMENTAL GROUP and the CONTROL GROUP are measured with respect to the dependent variable (the factor that is expected to change) before as well as after the exposure of the experimental group to the independent variable (the experimental treatment). The before-after type of the experiment sometimes is conducted without a separate control group. In this case the same group is compared before and after the experimental treatment, the group before the treatment serving in effect as the control group." (Theo, p. 139)

Experiment, Controlled.—"An experiment designed in advance and conducted under conditions in which it is possible to control relevant factors while measuring the effects of an experimentally introduced variable. In a controlled or contrived experiment subjects are divided into two groups, an EXPERIMENTAL GROUP and a CONTROL GROUP, with the subjects in the two groups matched with respect to all relevant characteristics or assigned to the two groups randomly or, most preferred when practical, matched in pairs and then assigned randomly from each pair. The VARIABLE that is hypothesized to be the independent variable (the effect of which is to be tested) is introduced into the experimental group and withheld from the control group. The experimental group and the control group are then compared to determine whether there are any significant differences between them in regard to the dependent variable (the factor that is expected to change) to determine whether the hypothesized effect of the independent variable has occurred in the experimental group and has not occurred in the control group. On the basis of this comparison the original hypothesis is confirmed or rejected." (Theo, p. 139)

Experimental Control.—"The process of holding constant all relevant factors other than the factor being studied in the experiment. In setting up an EXPERIMENTAL GROUP and a CONTROL GROUP, subjects are matched or randomly assigned so that the two groups are known to be the same or assumed to be essentially the same on all relevant characteristics (variables) except the experimental, or independent variable (the hypothesized cause of change). A factor is said to be controlled when the subjects compared are alike with respect to that factor." (Theo, p. 141)

Experimental Design, Completely Randomized.—"An experimental design in which subjects are exposed or not exposed to the experimental VARIABLE (the hypothesized independent or causal variable), or assigned to the experimental group or the control group, on a completely random basis. RANDOMIZATION is used instead of matching individuals to hold other relevant variables or characteristics constant." (Theo, p. 141)

Experimental Group.—"In an experiment, the group of subjects into which the experimenter introduces the independent variable (the hypothesized cause, or experimental treatment). The effect of the experimental variable is determined by contrasting the experimental group with the CONTROL GROUP, a group that has not received the experimental treatment but that is similar to the experimental group in respect to all other relevant factors." (Theo, p. 142)

Exploratory Study.—"A preliminary study the major purpose of which is to become familiar with a phenomenon that is to be investigated, so that the major study to follow may be designed with greater understanding and precision. The exploratory study (which may use any of a variety of techniques, usually with a small sample) permits the investigator to define his research problem and formulate his hypotheses more accurately. It also enables him to choose the most suitable techniques for his research and to decide on the questions most in need of emphasis and detailed investigation, and it may alert him to potential difficulties, sensitivities, and areas of resistance." (Theo, p. 142)

Extrapolation.—". . . any process of estimating values of a function beyond the range of available data . . . the process of extending a norm line beyond the limits of actually obtained data, in order to permit interpretation of extreme scores. The extension may be done mathematically by fitting a curve to the obtained data or, as is more common, by less rigorous methods, usually graphic. Considerable judgment on the test maker's part enters into any extrapolation process, which means that extrapolated norm values are likely to be to some extent arbitrary." (Te, p. 2)

F Test.—"A test of whether there is a statistically significant difference between two or more groups, or whether the groups are probably drawn from identical populations (or the same population) with differences between them due only to chance. The F test is based on the analysis of VARIANCE or the dispersion of values, and involves the relationship of the variance between groups to the variance within the groups. It is a parametric test, requiring the usual parametric assumptions (primarily concerning the population distribution in the population from which the samples were drawn)." (Theo, p. 144)

Face Validity.—". . . the questions in a test which appear to measure the knowledge of ability the test is intended to measure. Psychologists tend to discount face validity on the ground that appearances may be deceiving . . . if the observer is perceptive and experienced, his judgment that a test possesses face validity may carry considerable weight as an indication that it is valid." (A, p. 451)

Fact.—"1. A statement about a phenomenon that is based upon the observations or experiences of a wide variety of persons. 2. An observed phenomenon itself (a thing, an event, a measurement, a distribution, etc.)" (Theo, p. 144)

Factor.—". . . a hypothetical trait, ability, or component of ability, that underlies and influences performance on two or more tests, and hence causes scores on the test to be correlated. The term 'factor' strictly refers to a theoretical variable, derived by a process of factor analysis, from a table of intercorrelations among tests, but it is also commonly used to denote the psychological interpretation given to the variable—i.e., the mental trait assumed to be represented by the variable, as verbal ability, numerical ability, etc." (Te, p. 2)

Factor Analysis.—"Any of several methods of analyzing the intercorrelations among a set of variables such as test scores. Factor analysis attempts to account for the interrelationships in terms of some underlying 'factors,' preferably fewer in number than the original variables, and it reveals how much of the variation in each of the original measures arises from, or is associated with, each of the hypothetical factors. Factor analysis has contributed to our understanding of the organization or components of intelligence, aptitudes, and personality, and it has pointed the way to the development of 'purer' tests of the several components." (Te, p. 2)

Feedback.—"A process in which knowledge of the results of past performance (by an individual, a group, or a machine) leads to modification of future performance, thereby keeping performance effectively directed toward the attainment of a goal. For an individual, feedback is represented in any return communication in response to previous behavior—that is, knowledge of the results of one's past actions or attitudes—that allows a modification of one's future behavior or attitudes. Feedback is essential in any communications system and is involved in all social interaction. The concept of feedback is central to Cybernetics." (Theo, p. 154)

Field Study Method.—"A research technique in which the investigator observes his subjects under their usual environmental conditions of life, rather than under laboratory conditions. The subjects may or may not be aware of being observed. In sociology and anthropology, interviews are often used in such studies." (Theo, p. 157)

Field Theory.—". . . used by psychologists to describe approaches to the study of behavior which view it as a resultant of a pattern of forces operating in a space analogous to that employed in physical field theory." (G, p. 270)

Fisher Exact Probability Test.—"A nonparametric statistical technique used for analyzing DISCRETE DATA from two samples that are small in size. The Fisher test is used to determine whether there is a significant difference between two samples in the proportion of cases that fall in each of two mutually exclusive categories. The Fisher test is used in preference to the CHI-SQUARE TEST when the number of cases is small and the data are in a fourfold (2 x 2) table." (Theo, p. 158)

Fixed Alternative Question.—"A question that requires the respondent to select his answer from two or more specified alternatives, for example, 'yes,' 'no,' and 'undecided.' " (Theo, p. 158)

Forced-Choice Item.—". . . any multiple choice item in which the examinee is required to select one or more of the given choices. The term is best used to denote a special type of multiple-choice item, in which options, or choices, are (1) of equal 'preference value'—i.e., chosen equally often by a typical group but (2) of differential discriminating ability—i.e., such that one of the options discriminates between persons high and low on the factor that this option measures, while the other options do not." (Te, p. 3)

Frame of Reference.—"A point of view, standard, or system of concepts held by an individual (or group) that tends to organize experiences, perceptions, and interpretations. One's values and social norms, for example, profoundly influence one's observations, interpretations, and judgments in a social situation." (Theo, p. 161)

Frequency, Distribution.—"A classification of data showing the number of occurrences of each CLASS INTERVAL (subdivision of a quantitative variable) or CATEGORY of a VARIABLE. In the case of a quantitative variable the class intervals are arranged in order of magnitude. A frequency distribution provides a basic ordering of data, and is usually the first step in statistical analysis." (Theo, p. 162)

"A frequency distribution consists of a sequence of score intervals opposite each of which is recorded the number of scores in the total group falling in that interval. The terms 'frequency distribution' and 'distribution of scores' are nearly synonymous." (A, pp. 451–2)

Function.—"The consequences of the existence or operation of a unit (a custom, attitude, institution, etc.) for other units in a (social, cultural, or personality) system or for the system as a whole." (Theo, p. 165)

Generalization.—"1. The formulation of a general statement on the basis of a number of specific observations, for example, 'All ravens are black.' Generalization is a basic process in INDUCTION. 2. The tendency to think all persons who belong to the same category as having a wide variety of similar characteristics and, therefore, to reach general conclusions about the characteristics of all persons in a given category on the basis of the observation of a few individuals. 3. In psychology, the tendency for a CONDITIONED RESPONSE to be evoked not only by the stimulus to which the individual was conditioned, but also by all other similar stimuli." (Theo, p. 170)

Goodness-of-fit Test.—"A type of statistical test used to determine whether a given sample probably was drawn from a POPULATION with certain specified characteristics. The goodness-of-fit test is the usual type of test used with a single SAMPLE. The population with which the sample is compared may be an actual known population or it may be a theoretical distribution, such as the normal frequency distribution curve or a distribution that would be expected if a given hypothesis were true. The population and the sample may be compared in regard to central tendency, or average value, the shape of the distribution curve (normal, skewed, etc.), the proportion of frequencies in each category, and so forth. The usual goodness-of-fit testing PARAMETRIC STATISTICS compares the sample distribution with the normal frequency distribution curve. There are a number of specific tests of goodness-of-fit, including both parametric and nonparametric tests." (Theo, pp. 174–5)

Graphic Rating Scale.—". . . is a line whose ends represent contrasting extremes of a trait. The rater places a checkmark at a point along the line corresponding to his judgment of how much or how little of the trait the particular individual possesses. Sometimes the line is divided into segments, each of which is accompanied by a brief verbal description of how much of the trait it represents." (A, p. 452)

Halo Effect.—". . . describes a bias in ratings arising from the tendency of a rater to be influenced in his ratings of specific traits by his general impression of the person being rated." (A, p. 452)

Heterogeneity.—". . . when applied to the individuals in a group or the items in a test, refers to the degree to which they are different or unlike. The individuals or items in a highly heterogeneous group are very unlike." (A, p. 452)

Heuristic Assumption.—"An assumption made not because it has been established that it is true but because it is considered useful in the process of investigation. The heuristic assumption is regarded as a utilitarian device that is intended to aid in the discovery of new facts and relationships. For example, although it is known that there is great individual variation in human behavior, the heuristic assumption is made that there are enough similarities to classify individuals into such categories as roles and personality types in order to facilitate analysis." (Theo, pp. 185–6)

Homogeneity.—". . . as applied to the individuals in a group or the items in a test, refers to similarity. The items in a highly homogeneous test or the individuals in a highly homogeneous group are all very much alike. A highly homogenous group of students or set of test items is low in heterogeneity." (A, pp. 452–3)

Hypothesis(es).—"Statement(s) of the expected relationship(s) among the phenomena being studied; tentative explanation of a complex set of data not yet proved; a tentative deduction; usually the first step in problem solving." (A&L, p. 703)

"In scientific investigation, a tentative statement asserting a relationship between certain facts. The statement is intended to be tested empirically and either verified or rejected. A scientific hypothesis is derived from a theoretical system and the results of past research. The clear statement of a theoretically significant hypothesis related to previous research is crucial to a well designed scientific study." (Theo, p. 191)

Hypothesis, Null.—"A HYPOTHESIS of no difference or no relationship, that is, a hypothesis that states that there is no significant difference between two or more groups in regard to a given variable or no relationship between the variables being studied. It is used most often in experimental situations, and usually is employed for statistical convenience, being rejected at a given level of statistical significance. When it is rejected, the investigator turns to an alternative hypothesis. Because the null hypothesis is often formulated with the idea that the data will probably lead to its rejection, some sociologists are critical of its use. Its advocates argue that its use is parsimonious, that is, it states the simplest possible relationship among the data, and contributes to objectivity by starting the experiment with the provisional assumption that the experiment treatment will lead to no real difference between the experimental group and the control group. Because a null hypothesis cannot be proved, strictly speaking it cannot be accepted, and therefore one should speak of it only as being rejected or not rejected." (Theo, pp. 191–2)

Hypothesis, Statistical.—"A very specific HYPOTHESIS concerning the distribution of a particular population, which tentatively states one or more population parameters (a summary measure of a characteristic of a population). Like other hypotheses, the statistical hypothesis is formulated in order to be tested empirically. Although it is a statement about a total population, it is usually tested by comparison with data drawn from a sample. Unlike the usual scientific hypothesis, the statistical hypothesis refers to a particular population and does not assert a general proposition or suggest a reason for the specified population characteristics." (Theo, p. 192)

Hypothesis, Working.—"A HYPOTHESIS not yet subjected to empirical test. Often the term is used to refer particularly to a hypothesis dealing with phenomena or relationships about which there has been relatively little scientific research. Under these circumstances the hypothesis is necessarily very tentative. Indeed, because of the paucity of available knowledge on which a working hypothesis must sometimes be based, it has been referred to by some writers as a clever guess or perceptive hunch, which it is hoped will provide the basis for investigation that will result in more concrete knowledge." (Theo, p. 192)

IBM Scoring Machine.—". . . an electrical device for counting the number of correct or incorrect answers to the items in a multiple-choice or true-false test. The machine requires the use of a specifically designed answer sheet. It is capable of producing part scores, weighted scores, and scores corrected for guessing." (A, p. 453)

Index.—"Any measurable or observable phenomenon (or phenomena) that is used to indicate the presence of another phenomenon that cannot be measured directly or conveniently. . . . Indexes allow the researcher to quantify or observe aspects of a complex phenomenon, which then are assumed to reveal something about the phenomenon as a whole. . . . One may also use as an index a phenomenon not conceptually related to the phenomenon being studied, but simply related by correlation. . . . Usually, however, the choice of indexes to THEORY, that is, the choice of an index to represent a phenomenon represents some degree of definition of the conceptual nature of that phenomenon. Composite indexes tend to define what the investigator believes are the component parts (the nature) of the phenomenon he cannot measure directly." (Theo, p. 198)

Induction.—"The logical process in which generalizations are inferred from specific facts. Essentially, induction is the process of reasoning from individual instances to general principles. The experimental method is basically inductive, in that general conclusions are derived from individual observations." (Theo, p. 199)

Inference.—"A process of reasoning by which existing knowledge or truths are used to derive new knowledge or truths. Inference is a mental process in which the person starts with a proposition (or propositions) accepted as true and through the process of logic concludes that therefore a new proposition is true. The truth of the new proposition is seen as logically inherent in the truth of the accepted proposition. Inference may be either valid or invalid. Valid inference is known as implication. Inference may involve either DEDUCTION or INDUCTION." (Theo, p. 202)

Internal Consistency.—Refers to test items which "measure much the same thing and are therefore highly intercorrelated." "A measure of internal consistency provides one measure of test reliability." (A, p. 453)

Internal Criterion.—". . . is applied in judging the discriminating power of a test item when the score on the total test containing that item is used as a basis for choosing students for the high and low achievement groups. Although indices of discrimination based on the use of an internal criterion are always inflated somewhat, the degree of inflation is not large in moderately long tests. Further, good external criteria are seldom available." (A, p. 453)

Interpolation.—". . . any process of estimating intermediate values between two known points. As applied to test norms, it refers to the procedure used in assigning interpreted values (e.g., grade or age equivalents) to scores between the successive average scores actually obtained in the standardization process." (Te, p. 3)

Interpretation.—"The application of a conceptual scheme or MODEL to observed data in order to relate a fact logically to other facts and explanations. The interpretation of what is observed serves to associate one observation with other current and past observations or even with hypothetical occurrences or relationships. Data must be interpreted if they are to lead to further hypothesis and research." (Theo, p. 213)

Interval Scale.—"A SCALE in which the distance between each of the numbers or units on the scale is equal. The construction of such a scale assumes that the intervals can be quantified, that they are equal, and that the direction (greater, equal, or less) is known. A ruler and a thermometer are interval scales. The THURSTONE EQUAL-APPEARING INTERVAL SCALE is an attempt to approximate an interval scale." (Theo, p. 213)

Interview.—"A conversation between an investigator and an informant for the purpose of gathering information. A number of the social sciences use the interview as one of their methods of data gathering." (Theo, p. 213)

Interview, Focused.—"An INTERVIEW that concentrates the investigation on selected aspects of a specific event or situation experienced by the respondent. . . . Focused interviews generally must be carefully prepared to concentrate on the most relevant aspects of the problem being studied, and therefore tend to be quite structured. The term was introduced by Robert K. Merton, Marjorie Fiske, and Patricia L. Kendall in *the focused interview* (Free Press, Glencoe, Ill., 1956)." (Theo, p. 214)

Interview, Nondirective.—"An unstructured INTERVIEW in which the respondent is given a maximum amount of freedom to engage in spontaneous conversation, that is, to discuss material he thinks is most crucial. The interviewer asks a minimum of questions and gives few suggestions." (Theo, p. 214)

Interview Guide.—"A list of topics for use in relatively unstructured interviews that serves to order and assure the coverage of important subjects by an interviewer. The interview guide differs from an INTERVIEW SCHEDULE in that it does not consist of a set of fixed questions, and therefore allows for greater flexibility and informality between the respondent and the interviewer." (Theo, p. 214)

Interview Schedule.—"A list of questions used by an interviewer to structure and guide his questioning of a respondent. The interviewer asks the questions and records the answers himself. It is a QUESTIONNAIRE filled out by the interviewer instead of the respondent. The use of an interview schedule allows the respondent to ask for clarification and explanation of unclear or difficult questions. It also allows the interviewer to record responses not directly anticipated in the design of the study. However, interview schedules may be highly structured with the interviewer simply reading the questions and recording answers based on predetermined alternatives, such as yes or no, or agree or disagree. The latter technique may be useful, for example, when literate but otherwise untrained interviewers are interviewing nonliterate or illiterate respondents." (Theo, pp. 214–5)

Item.—"A single question or exercise in a test." (Te, p. 3)

Item Analysis.—"The process of evaluating single test items by any of several methods. It usually involves determining the difficulty value and the discriminating power of the item, and often its correlation with some criterion." (Te, p. 3)

Kolmogorov-Smirnov D Test.—"A nonparametric statistical test designed to measure whether the difference between two frequency distributions probably is significant or is merely due to chance. The two frequency distributions being compared may be the distributions of two independent samples or the comparison may be between the distribution of one sample and a theoretical distribution. In the Kolmogorov-Smirnov test the cumulative percentages of the two distributions in each category or CLASS INTERVAL are compared." (Theo, pp. 221–2)

Kuder-Richardson Formula.—". . . provides estimates of the reliability of a single test from a single administration. The information ordinarily required is the number of items in the test, the standard deviation of the test scores, and the difficulty of each item in the test, or the average difficulty of all items as reflected in the mean test score. Because of this convenience and their statistical soundness, the Kuder-Richardson formulas are now widely used in the estimation of test reliability." (A, p. 454)

Likert Scale.—"A summated attitude scale consisting of a series of items (attitude statements) each of which is rated by the respondent to indicate his degree of agreement or disagreement. Typically each statement has five possible responses: strongly agree, agree, uncertain, disagree, strongly disagree." (Theo, p. 232)

Limits, Principle of.—"The principle that a particular relationship found between two variables may occur only within certain limits. Beyond these limits there may be no relationship between the variables or even a reverse relationship." (Theo, p. 233)

Mean-Whitney U Test.—"A nonparametric statistical test based on rank order. When data from two samples are in the form of ranks, or relative position in terms of magnitude, this test may be used to determine whether one sample has significantly higher ranks than the other sample. On this basis the test indicates whether the two samples probably are drawn from different populations or from the same population with the observed differences due merely to chance. The Mann-Whitney U test is generally regarded as one of the most powerful nonparametric tests available for determining differences in central tendency in a series of data. It provides a nonparametric alternative for the parametric t TEST." (Theo, pp. 241–2)

Matching.—"A form of EXPERIMENTAL CONTROL in which the subjects selected for the EXPERIMENTAL GROUP are similar to the subjects selected for the CONTROL GROUP in regard to those variables that the experimenter considers relevant to his study." (Theo, p. 247)

Mean.—". . . is a measure of the central tendency or of the average numerical value of a set of scores. It is calculated by adding all of the scores and dividing the sum by the number of scores." (A, p. 454)

Meaning.—"An interpretation of the significance of a situation, act, idea, or object with reference to how one should respond." (Theo, p. 250)

Measure.—"1. A standardized mathematical unit used in the MEASUREMENT of a specific characteristic." (Theo, p. 250)

Measured Work.—"Elements of the operation which are included in the normal time."

Operator controlled. "That portion of the total measured work which can be affected by the employee's skill and effort."

Machine controlled. "That portion of the total measured work which is mechanically paced, . . . so that it cannot be influenced by the operator's skill and effort." (Bar, p. 211)

Measurement.—"The qualification of observations. Measurement involves the expression of observed characteristics, or relationships, in numerical form." (Theo, p. 250)

". . . is a process of assigning numbers to the individual members of a set of objects or persons for the purpose of indicating differences among them in the degree to which they possess the characteristic being measured. If any characteristic of persons or things can be defined clearly enough so observed differences between them with respect to this characteristic can be consistently verified, the characteristic is measurable. A more refined type of measurement involves comparison of some characteristic of a thing with a preestablished standard scale for measuring the characteristic." (A, pp. 454–5)

Median.—". . . is the point in a score distribution which divides it into two parts containing equal number of scores. If the number of scores in the distribution is odd, the median is the middle one. If the number is even, the median is a point midway between the two scores nearest the middle. The median is identical with the fifth decile of the fiftieth percentile." (A, p. 455)

Methodology.—"1. The logic of scientific investigation. . . . Methodology is not concerned with building substantive knowledge, but rather deals with the procedures by which knowledge is built—conceptual, logical, and research procedures." (Theo, p. 254)

Mode.—". . . is the most frequently occurring value in a frequency distribution. If the frequency distribution is displayed graphically, the mode is the score corresponding to the highest point on the curve." (A, p. 455)

Model.—"A pattern of relationships, either conceptual or mathematical, which is found in some way to imitate, duplicate, or analogously illustrate a pattern of relationships in one's observations of the world, such as patterns in social behavior or social structure. The world of perceived reality is a product of the organization of perceptions according to some previously learned pattern. Scientists consciously attempt to discover order in nature by relating observations and data by analogy to previously developed patterns of relationship already in use for observing and ordering other types of data. . . . Models may be very simple or very complex. Since the world we observe cannot be observed in its totality, each model reflects only a limited aspect of the total world. Hence each model is an ordering of only selected aspects of reality. No single model or combination of models reveal the truth of the structure of reality. Each model reveals and orders reality from a particular perspective. The value of a model is determined by its usefulness for guiding study. Models are tentative and limited, yet they are the building blocks of theory, interpretation, empirical discoveries, prediction, and general scientific progress." (Theo, p. 261)

Model, Conceptual.—"A diagrammatic representation of a postulate or concept. A model in research is a symbolic or physical visualization of a theory, law, or other abstract construct. It is an analogy of the actual phenomenon expressed in a format that is more readily grasped and understood than the abstract conceptual scheme it is used to describe. Models can either be physical or symbolic. Physical models include life-like physical representations, abstract physical representations, and schematic and other diagrams. Symbolic models include mathematical and statistical models in which letters of the alphabet are used to represent the various elements included in the model, while specially devised symbols are used to indicate the mathematical operations designated by the model. Mathematical models are an exact quantitative formulation of the relationship among the factors they include. A statistical model states the quantitative relationship among the factors in probabilistic terms." (A&L, p. 704)

Model, Theoretical.—"1. It may denote an actual physical model; i.e., an artifact such that its parts, their relations, and its working are suitably analogous to some other system. . . . 2. It may denote a merely conceptual model; i.e., the envisaging or the specification in words of an artifact. . . . 3. It may denote the envisaging or the specification in words of a system simpler in various ways than some other system of which it is a model, simpler but not otherwise dissimilar. . . . 4. There is a tendency to call any theory whatever a model, in as far as any theory tends to possess at least unwittingly the features intended to characterize models in the sense. . . . 5. By a similar argument, it has been maintained that any proposition, whatever, whether theoretical or not, either is or represents a model." (G, p. 435)

Multivariate Analysis.—"The analysis and interpretation of the interrelationships of three or more variables. This may be done by introducing an intervening variable into the analysis of the relationship between two variables, by successfully controlling on a series of variables, or by the use of techniques such as FACTOR ANALYSIS or the factorial experiment." (Theo, p. 269)

N.—"The symbol commonly used to represent the number of cases in a distribution, study, etc." (Te, p. 3)

Non-Empirical.—"1. Methodologically the term is used to describe all methods of acquiring belief other than those of positive science or its rough equivalents in everyday life. 2. Substantively it is used to describe philosophical, religious, or idealogical beliefs gained by other than scientific methods. . . ." (G, p. 471)

Nonparametric Statistics.—"That branch of statistics comprising techniques of statistical analysis that do not entail assumptions about the exact form of the distribution of the POPULATION. The use of nonparametric statistical tests does not require that the SAMPLE being analyzed be from a population with a normal distribution or with any other specified distribution (that is, the exact shape of the distribution of the population need not be known). Therefore, nonparametric statistics are sometimes referred to as distribution-free statistics. The term 'nonparametric' itself refers to the fact that these techniques do not make stringent assumptions or assertions about population parameters (but only some limited, less restrictive assumptions about the nature of the population), and deal primarily with the sample data. Moreover, whereas data must be in the form of absolute scores or values to be used in PARAMETRIC STATISTICS, there are nonparametric techniques that may be used with data in the form of ranks (ordinal scale), techniques for use with data classified as plus or minus (higher or lower), and techniques for data simply in categories (nominal scale). Nonparametric statistics are a more recent development on statistics than parametric statistics. Generally, the power of nonparametric tests is less than that of parametric tests, but the nonparametric techniques have been growing in popularity because of the difficulty of meeting the stringent assumptions of the parametric model." (Theo, p. 276)

Norm(s).—". . . is used in relation to test scores, is the average or typical test score (or other measure) for members of a specific group. Norms are often presented in tables giving the typical score values for a series of different homogeneous groups such as students in a given grade or students of a given age." (A, pp. 455–6)

"Statistics that describe the test performance of specified groups such as pupils of various ages or grades in the standardization group for a test. Norms are often assumed to be representative of some larger population, as of pupils in the country as a whole. Norms are descriptive of average, typical, or mediocre performance; they are not to be regarded as standards, or as desirable levels of attainment. Grade, age, and percentile are the most common types of norms." (Te, p. 4)

"The term 'norm' denotes (a) a statistical standard of comparison constituted by what is in some sense the average or modal value of the variable on which the items in a population are being compared; (b) the average or modal; i.e., most typical behavior, attitude, opinion, or perception found in a social group; (c) a standard shared by the members of a social group to which the members are expected to conform. . . ." (G, p. 472)

Norm, Statistical.—"A mathematical value, measure, or score used as standard for comparison. A norm may be derived from observed data. For example, it may be an average score of a large number of persons of a given type with which the scores of individuals or subdivisions are compared. It is also possible to derive a norm from a theoretical distribution. In the latter case observed data are compared with hypothetical norms based on the assumption of specified conditions." (Theo, p. 277)

Normal Distribution.—". . . is an ideal frequency distribution defined by a mathematical formula. It is represented by a symmetrical, bell-shaped curve characterized by scores concentrated near the middle and tapering toward each extreme. Tables have been prepared to show the height of the ordinate at various points along the baseline (score scale) and for showing areas under the curve in various intervals along the baseline. The heights of the ordinates indicate the relative frequencies of each score in the distribution. The areas under the curve over various score intervals indicate what proportion of the total number of scores fall in that interval." (A, p. 456)

Normal Time.—". . . time required under standard conditions to perform the measured work at a normal pace, excluding any allowances." (Bar, p. 211)

Objective Test.—" . . . is one which can be provided with a simple predetermined list of correct answers, so that subjective opinion or judgment in the scoring procedure is eliminated. . . . The scoring of short-answer or completion items is partly objective." (A, p. 456)

Observation.—"1. In more general usage, the examination of behavior directly by an investigator or by persons who serve as observers. Usually the observed items of behavior are recorded, enumerated, or classified by the observer or observers. Recording devices or other tools may be used to simplify the process. Observation of complex phenomena usually requires some degree of analysis, synthesis, or interpretation of the data. . . . 2. The examination, recording, or enumeration of events or phenomena. According to this definition, observation may be either direct and personal or indirect and impersonal; for example, gathering data through mailed questionnaires would be regarded as observation. In fact, in this usage, any data collection is considered observation, including the collection of data from records. Thus in statistics any individual score or response is referred to as an observation." (Theo, pp. 279–80)

Observation, Nonparticipant.—"A method of OBSERVATION in which an investigator directly observes a group without becoming a functioning member of the group or taking part in its activities. The group members may or may not know that the investigator is observing them. If they do know, they regard him as an outsider who is interested in watching and recording their activities but not interested in becoming a regular member of the group." (Theo, p. 280)

Observation, Participant.—"A method of OBSERVATION in which an investigator participates as a member of the group he is studying. Participant observers are sometimes known by the group members to be observers, though they have joined the activities and taken on the obligations of a group member. In other cases, the observer is believed to be an ordinary member, and the group members are not aware that they are being observed. The concept was introduced by Edward C. Lindeman in his book *Social Discovery* (Republic Publishing Co., New York, 1924)." (Theo, p. 280)

Observer(s).—"Research personnel who collect the data." The nonparticipant observer is one who "serves as the recorder of the data but is not one of the study subjects." The participant observer is one who "collects the required data while taking part in the activity being studied." (A&L, p. 705)

Should be familiar with the individual he is observing. He is "relied upon to carefully and accurately observe and record" the exact activity. (Bar, p. 67)

Observation Form.—Designed for each work sampling study and reflects the purpose of the study. "The form should be simple, arranged to facilitate recording and summarizing data and should contain sufficient space to record all information that may be needed to prepare the final report of the study." (Bar, p. 67)

One-Tailed Test.—"A statistical test used to test a

HYPOTHESIS when the direction of the difference between samples or the relationship between variables is predicted in the hypothesis. . . . The term 'one-tailed' refers to the fact that the REGION OF REJECTION of the null hypothesis . . . is located entirely at one end (or tail) of the SAMPLING DISTRIBUTION." (Theo, p. 283)

Operational Definition.—"A series of words that clearly designates performable and observable acts or operations that can be verified by others." (A&L, p. 705)

". . . is a definition that uses observable process, actions, or structural analogues (or explicit and detailed work descriptions of them) to describe concepts represented by the term being defined; an operational definition is an explicit description of a single entity or phenomenon considered to be a concrete referent of the term being defined, whether the referent be an object, a process, or an action; it specifically identifies a single entity or phenomenon to be measured to provide one component of a score of the variable or characteristic being measured and evaluated. Put more succinctly, an operational definition is a description or actual display of a process, action, or object suggested as an analogue or single representative example of what is meant by the term being defined. It is the 'for instance' portion of a three-phase definition of a term." (Wa, p. 315)

"A definition of an abstract concept in terms of simple, observable procedures. The measuring procedure constitutes the full extent of the definition as well as the method of observation of the phenomenon. . . . An example would be the definition of intelligence in terms of I.Q. score or social class in terms of income. Thus, concepts are tied to readily measurable and readily communicated phenomena and, in a sense, one determines what one wishes to define by finding an acceptable way of measuring it empirically. The operational definition is very important in social research, but many concepts relating to human values and role behavior are extremely complex—too complex to be expressed fully and adequately in simple operational terms. Rigid operational definitions have a limited, though important, role in social research." (Theo, p. 284)

Operationalism.—"A position in the philosophy of science holding that scientific concepts and research procedures are inseparable. Thus the only scientifically valid concepts are OPERATIONAL DEFINITION—definitions so constructed that the means of measuring the concept constitute the definition of the concept." (Theo, p. 284)

Operationism for Operationalism.—". . . is the insistence upon the use of operational definitions in science whenever the meaning of a term in quantitative discourse is to be understood." (G, p. 475)

Ordinal Scale.—"A SCALE in which the categories have an inherent order of magnitude according to which they are arranged. The categories represent degrees of magnitude of a given characteristic, and may be ranked from greatest to least, highest to lowest, or first to last. There is no implication that there is an equal distance between succeeding categories or that the categories represent a uniform rate of increase or decrease. That is, there may be twice as great a distance between the first and second categories as there is between the second and third categories. An ordinal scale provides only a rank order of categories." (Theo, p. 286)

Parameters.—"Summary measures, such as means and standard deviations, that are computed from data obtained from all the sampling units in the target population." (A&L, p. 706)

"A summary measure of a characteristic of a POPULATION. A parameter may be a measure of central tendency, such as a MEAN, a MEDIAN, or a MODE, a measure of dispersion such as a STANDARD DEVIATION, a measure of association between two variables such as a COEFFICIENT OF CORRELATION, or any other measure of the distribution of one or more characteristics in a population. It is important to note that parameter is a measure of an entire population, or universe, and not a measure of a SAMPLE. Since most social research deals with samples, true parameters are usually unknown and must be estimated from sample data." (Theo, p. 291)

Parametric Statistics.—"That brand of statistics comprising techniques of statistical analysis which require that the data being analyzed be drawn from a population distribution with a specified form. Usually parametric techniques assume that the POPULATION from which the SAMPLE was drawn has normal frequency distribution. In addition, parametric techniques require that each case included in the sample has been included independently of every other case (that is, the inclusion of one case does not automatically lead to the inclusion of another case), that when samples have been drawn from two or more populations these populations have the same VARIANCE or in some cases a known ratio or variances, and that the data be in arithmetic form (so that they can be added, divided, multiplied) and not in the form of ranks. Parametric statistics developed earlier than NONPARAMETRIC STATISTICS." (Theo, p. 291)

Percentile (P).—"A point (score) in a distribution below which falls the percent of cases indicated by the given percentile. Thus the 15th percentile denotes the score or point below which 15 percent of the scores fall. 'Percentile' has nothing to do with the percent of correct answers an examinee has on a test." (Te, p. 4)

Percentile Rank.—"The percent of scores in a distribution equal to or lower than the score corresponding to the given rank." (Te, p. 4)

Performance Index.—". . . the quotient found by dividing the earned normal minutes (normal time per piece multiplied by the total number of pieces produced) by the measured work time in minutes. The measured work time is determined by multiplying the total actual clock time by the percent of the total actual time spent on measured work." (Bar, p. 211)

Performance Test.—". . . the subjects ordinarily respond by overt action, that is by motor or manual behavior. In a performance test the subject is required to demonstrate his skill by manipulating objects or instruments." (A, pp. 456–7)

Phi-Coefficient.—". . . is an index by relationship between two variables, each of which yields only two different values. For example, one could calculate a phi-coefficient between the scores of a group of students on two items in a test. In this case the two variables to be related are scores on the two items for each of a number of students. The phi-coefficient is relatively simple to compute." (A, p. 457)

Pilot Study.—"A study carried out before a research design is completely formulated to assist in (a) the formulation of the problem, or (b) the development of hypotheses, or (c) the establishment of priorities for further research. Also called an exploratory study." (A&L, p. 706)

Poisson Distribution.—"A limited form of the BINOMIAL DISTRIBUTION (a theoretically expected distribution of a series of random samples drawn from a population with two categories or classes) that occurs when the number of cases in the samples is large and drawn from a very large population and the proportion in one of the two categories is very small." (Theo, p. 302)

Population.—". . . is the general group or category of entities under study; individual entities in the population may be animate or inanimate; animal, vegetable, or mineral. The population is represented in the study by selected subjects from whom the facts needed as data derive." (Wa, p. 316)

Postulate.—"A proposition within a science that is assumed to be self-evident or a true statement of fact, or is stipulated to be true. Although not proved, it is not contradicted by any facts or principles of the science, and is a reasonable and necessary assumption." (Theo, p. 307)

"A postulate is a proposition we ask others to 'take for granted,' or at least for purposes of further discussion." (G, p. 522)

Practice Effect.—"The influence of previous experience with a test on a later administration of the same test or a similar test; usually, an increase in the score or on the second testing, attributed to increased familiarity with the directions, kinds of questions, etc. Practice effect is greatest when the interval between testings is small, when the materials in the two tests are very similar and when the initial test-taking represents a relatively novel experience for the subjects." (Te, p. 4)

Prediction.—"The foretelling of an event or set of events. In the sciences, the term is usually used with reference to cases where the antecedent factors leading to the event are known, controllable, or mechanical." (Theo, p. 310)

"The term, 'prediction, refers to the act of stating beforehand the outcome of a course of change that must or may be expected to occur." (G, p. 525)

Principal Investigator.—"One designated as assuming major responsibility for the administration of the research. The individual who originated the study, developed the initial research plan, and is responsible for the scientific merit of the research." (A&L, p. 708)

Probability.—"The likelihood that out of a specified number of equally likely and mutually exclusive occurrences a given event or relationship will occur. Probability, thus, refers to a proportion—the proportionate frequency with which a given outcome is expected out of the total frequency of all outcomes. . . . There are many statistical tests designed to determine the probability that observed occurrences, relationships, or differences are due to chance. Statistical probability, often written p, may range from 0 to 1 and usually is expressed in decimal form as greater or less than a given level. Thus, for example, $p<.05$ means that the probability is less than 5 out of 100 that a given result would occur by chance alone, or, put another way, on a purely chance basis one could expect this outcome fewer than 5 times out of 100." (Theo, p. 314)

"The probability of an occurrence is a decimal fraction expressing the ratio of actual occurrences to opportunities for occurrence. The analysis and computations of probabilities make up a special branch of mathematics." (A, p. 457)

"The probable error of a set of test scores is the median error of measurement in absolute value. Half of the errors of measurement are larger and the other half smaller than the probable error of measurement. The probable error is usually calculated from the standard error. . . . The probable error is a good measure of the estimated accuracy of a test score but not of its reliability, since a longer and more reliable test may have a larger probable error of measurement than a shorter, less reliable test." (A, p. 457)

Procedure.—1. State the problem in detail. 2. After gaining approval of the department, be certain that individuals in the study understand the purpose of the study. 3. The desired relative accuracy or the desired absolute accuracy and the confidence level should be stated. 4. A preliminary estimate of the occurrence of activity or delay based on a 1 or 2 day preliminary sampling study should be made. 5. The design of the study must include the determinants of number of observations, observers, and days or shifts and plans for the route to be followed by the observer and the observer form must be identified. 6. The data should be summarized according to the plan of recording data, summarized at the end of the day, determine the control elements and plot the data on a chart each day. 7. The accuracy of the data should be checked at the end of the study. 8. State the conclusions and make the necessary recommendations. (Bar, pp. 63–4)

Project Director.—"An individual who is designated to work under the direction of the principal investigator and is responsible for the technical aspects of the research, such as data collection. Some studies designate only a project director, in which case the individual carries out the functions of both the principal investigator and the project director." (A&L, p. 708)

Q sort.—". . . is a technique for standardizing the measurement of the relevance or applicability of description statements to a particular subject. The judge making the Q sort is given a set of cards on each of which a different descriptive statement is written. He is directed to sort these statements into a given number of piles with the statements more applicable to the person being rated placed in the pile at one extremity and those least applicable in a pile at the other extremity. Not only the number of piles to be used, but also the number of statements to be placed in each pile is often prescribed in advance. By this means appropriateness of each statement to a given individual can be measured. If the rating is repeated for another individual, it is possible to correlate these statement scores for the two persons as the measure of the similarity of their personality." (A, pp. 458–9)

Quartile.—". . . is one of three points along the score scale of a frequency distribution which divide the distribution into four parts of equal frequency. The first quartile corresponds to the twenty-fifth percentile, the second to the median, or fiftieth percentile, and the third to the seventy-fifth percentile." (A, p. 459)

Questionnaire.—". . . a list of planned written questions relating to a particular topic, usually intended to gather descriptive information from a number of selected respondents. An important difference between a questionnaire and a test is that in a questionnaire the responses are ordinarily summarized question by question, whereas in a test they are summarized respondent by respondent." (A, p. 459)

"1. A form of document having a set of questions the answers to which are to be filled in personally by the respondents. If an interviewer writes or records the responses on the form, it is called an INTERVIEW SCHEDULE." (Theo, p. 327)

Randomization.—"The use of chance to control extraneous variables in an experiment. Randomization is often used in addition to MATCHING in controlled experiments. Subjects are matched in pairs on those variables which the experimenter seeks to control, and then one member of each pair is assigned to the EXPERIMENTAL GROUP and one to the CONTROL GROUP on a random basis, such as the toss of a coin. Thus, randomization is used to equalize on a chance basis the factors (often unknown) that are not specifically controlled but that might affect the outcome of the experiment. Randomization is also used sometimes without matching. That is, subjects are assigned to the experimental and control groups on a purely random (chance) basis. In addition, it may be possible to use randomization at other points in an experiment to minimize the possibility of bias." (Theo, p. 330)

"A technique in experimental research to equalize the composition of the various groups under study so that they are identical in respect to all pertinent organismic variables. Subjects are allocated to the different study groups according to the laws of chance. The procedure of randomization is known as random assignment or allocation." (A&L, p. 707)

Randomness.—"The occurrence of events in an unpredictable order. The occurrence of one event does not affect the occurrence of the other events; each occurs independently. Moreover, the occurrence of an event is not in any way related to its characteristics. Random occurrences cannot be predicted in any formula, for they depend entirely on chance. Thus in a series of coin tosses one cannot predict or state in a formula in what order heads and tails will appear, as the outcome of each toss is independently determined by chance." (Theo, p. 331)

Random Numbers.—" . . . there is no observable system or order in the sequence of the digits . . . one cannot predict with better than chance success which digit will occur at a given point in the table or which digit is likely to follow some other digit." (A, p. 459)

Random Sample.—"A sample of the members of a population drawn in such a way that every member of the population has an equal chance of being included—that is, drawn in a way that precludes the operation of bias or selection. The purpose in using a sample thus free of bias is, of course, that the sample be fairly 'representative' of the total population, so that sample findings may be generalized to the population. A great advantage of random samples is that formulas are available for estimating the expected variation of the sample statistics from their true values in the total population; in other words, we know how precise an estimate of the population value is given by a random sample of any given size." (Te, p. 5)

Range.—"The total spread of values in a FREQUENCY DISTRIBUTION. The range is the difference between the highest value and the lowest value in the distribution. If the data are grouped the range is obtained by subtracting the midpoint of the lowest CLASS INTERVAL (subdivision of the variable) from the midpoint of the highest class interval. The range is the simplest and most easily obtained measure of dispersion; however, it has the serious disadvantage of being determined entirely by the most extreme values in the distribution." (Theo, p. 331)

Range of Scores.—". . . is the smallest interval on the score scale which will include all of the measures in the distribution. It is sometimes defined, more simply but somewhat inaccurately, as the difference between the highest and the lowest scores in the distribution. The range of scores provides a simple measure of the variability of the scores of the distribution." (A, p. 459)

Rank, Statistical.—"Position in a series arranged in order of magnitude. The rank of a case tells where it stands in the magnitude of given variable relative to the other cases in the sample. Ranking does not assume equidistance between cases. For example, in a set of scores, the score that ranks first may be twice the score that ranks second, but the score that ranks second may be only slightly higher than the score that ranks third. Therefore, when only ranks are available they cannot be treated mathematically as scores. In statistical analysis there are nonparametric tests available for use with data in the form of ranks." (Theo, pp. 331–2)

Rate.—"1. A type of ratio in which the numerator gives the number of occurrences of an event within a specified period of time and the denominator gives the number of units to which the event could occur or the total number of possible occurrences of the event." (Theo, p. 332)

Rate Score.—". . . is the measure of an individual's speed of performance of tasks of a particular type, stated either in terms of the number of units of work done in a given time or the number of units of time required to complete a given amount of work." (A, pp. 459–60)

Rating Scale.—"A graduated series of categories arranged in sequential order (from highest to lowest, most favorable to least favorable, greatest degree to least degree, and so forth) for use in rating the characteristics of others or oneself." (Theo, p. 333–4)

Ratio.—"A relationship between two quantities expressed in the form of a fraction or a quotient. In a ratio the size of two numbers is compared by expressing one as a fraction of the other or dividing one by the other." (Theo, p. 335)

Raw Score.—"The first quantitative result obtained in scoring a test. Usually the number of right answers, number right minus some fraction of number wrong, time required for performance, number of errors, or similar direct, unconverted, uninterpreted measure." (Te, p. 5)

Regression.—". . . the tendency for predicted scores to lie closer to the mean than the predictor scores when the two are correlated and expressed on the same standard score scale. If the two measures were perfectly correlated, there would be no regression. Since height and weight are correlated positively, but not perfectly, the tallest individual in a group is likely to be heavier than the average individual but is unlikely to be the heaviest individual. The heights of fathers and sons are correlated, but not perfectly correlated. The fact that the sons of tall fathers tend to be taller than the average of their generation reflects this correlation. But the fact that the sons of tall fathers tend to be not as tall relative to the whole population as their fathers is an illustration of regression. Regression accounts for some of the findings that high-aptitude students seem to be underachievers and low-aptitude students overachievers." (A, p. 460)

Relevance.—". . . is the extent to which it contributes to the purposes of the test by virtue of the abilities it calls into play. . . . Relevance is one of the major aspects of quality in tests of educational achievement." (A, p. 460)

Relevant.—"The relevance of a task in a test is the extent to which it contributes to the purposes of the test by virtue of the abilities it calls into play. For example, a question that asks students to give the dates of birth and death of several English poets may have low relevance in a test of poetic appreciation. On the other hand, a question asking a student to calculate the standard deviation of a set of scores might have high relevance in a test of ability to use statistical techniques. Relevance is one of the major aspects of quality in test of educational achievement." (A, p. 460)

Reliability.—"The extent to which a test is consistent in measuring whatever it does measure; dependability, stability, relative freedom from errors of measurement. Reliability is usually estimated by some form of RELIABILITY COEFFICIENT or by the STANDARD ERROR OF MEASUREMENT." (Te, p. 5)

"A criterion for assessing the quality of data. Data are reliable if they are consistent, accurate, and precise. Another term for reliability is precision." (A&L, p. 707)

Reliability Coefficient.—". . . is the estimate of the coefficient of correlation between the scores of students in a particular group on two equivalent forms of the same test. If equivalent forms of the same test are not available, the reliability of a single form can be estimated by splitting it into equivalent halves and using the correlation between scores on equivalent full-length tests. The reliability of a test may also be estimated on the basis of the variance of the test scores and of the item scores. Reliability is sometimes defined also as the proportion of total score variance which is not error variance, i.e., attributable to errors of measurement." (A, pp. 460–1)

Representative Sample.—". . . one chosen in such a way as to make it more likely than a random sample to exhibit the same characteristics as the population. Representative samples are often stratified samples, with predetermined numbers of cases chosen randomly from different geographical areas, different age groups, or other sub-groups which are thought to differ systematically with respect to the characteristic being measured." (A, p. 461)

Research Associate or Assistant.—"A junior investigator who works under the direction of the project director." (A&L, p. 708)

Research Basis.—"RESEARCH conducted for the purpose of developing scientific theories or the basic principle of a discipline, rather than for the purpose of solving some immediate problem." (Theo, p. 347)

Research Critique.—"A critical estimate of a piece of research which has been carefully and systematically studied by a critic who has used specific criteria to appraise the favorable, less favorable, and other general features of the research study. Generally, a research critique has some descriptive statements about the research study; however, the central focus is upon a *critical appraisal* or *estimate* of the study, rather than a descriptive account of what is *in* the study." (L, p. 2—drawn from Leininger, Madeline M. "The Research Critique: Nature, Function and Art," *Communicating Nursing Research: The Research Critique.* (Marjorie V. Batey (Ed.)), Boulder, Colorado: Western Interstate Commission for Higher Education, 1968, pp. 20–21)

Research Report.—"The formal statement of a research investigation in which there has been a formal statement of purpose or question and the intent is to 'provide new knowledge for the world at large.' It is an account of the investigation for submission to a press or to a body to whom it is accountable for funding." (L, Exhibit 1)

Reseach Review.—"A general descriptive account of a research study in which the reviewer identifies and summarizes the major features of the study." (L, p. 2—drawn from Leininger, op. cit., p. 20)

Review.—"6a. a critical evaluation. . . ." (W, p. 736)

Sample.—"In statistics, a portion of the total number of cases having a given characteristic or (characteristics). A sample consists of a limited number of cases selected for study from a particular POPULATION." (Theo, p. 361)

Sample, Random.—"A SAMPLE selected purely on the basis of chance. In the selection of a random sample, each case is independently chosen; that is, the selection of one case in no way affects the likelihood of any other case's being selected. In addition, in choosing a random sample every case in the POPULATION has the same probability of being included in the sample. Moreover, if enough samples of a given size were chosen in a random manner from a population, eventually every possible combination of cases would occur, and in the long run every combination would occur about the same number of times. A random sample can be drawn by placing cards in a container—one card for each case in the population—thoroughly mixing the cards, and then, selecting the desired number of cases. To avoid the tediousness this procedure involves, particularly with large populations, and for greater convenience, a computer or a table of random numbers is usually used instead of drawing lots. In using a table of random numbers, the investigator numbers all the cases in the population and then, starting at any point on the table selects those cases whose numbers follow in successive order. The random sample, in which each individual case is drawn from the population as a whole, is frequently referred to as a simple random sample to distinguish it from samples in which random selection is combined with another sampling technique, as in the stratified random sample or the area sample." (Theo, p. 363)

Sample, Stratified.—"A SAMPLE selected by dividing a POPULATION into categories (strata) on the basis of certain relevant variables and selecting a determined number of cases from each category, thus assuring that each category will be represented in the sample. If the proportion of cases in each category is the same in the sample as in the population as a whole, the sample is known as a proportional stratified sample, or sometimes simply a proportional sample. If the cases included in the sample are selected randomly within each category (a random sample of specified size being taken of each category), the sample is a stratified random sample. If the cases chosen within each category are not selected randomly, the sample is a stratified nonrandom sample, usually referred to as a quota sample. A proportional stratified random sample provides an efficient means of obtaining a representative sample when sufficient information about the population characteristics is available." (Theo, pp. 363–4)

Sample, Systematic.—"A SAMPLE obtained by selecting every *n*th case from an arbitrary list (for example, an alphabetical list) of all the cases in the POPULATION. The size of *n* is determined by dividing the size of the population by the size desired for the sample. Thus if a sample of 100 is desired from a population of 1,000 every 10th case would be selected. The first case is selected at random between 1 and *n*. Thus if *n* were 10, the first case selected at random between 1 and 10 might be 4. Then included in the sample would be the 4th case, the 14th case, the 24th case, etc. In selecting a systematic sample, the investigator must be careful that cases with a certain characteristic or characteristics do not occur in regular intervals on the list. This method is also referred to as sampling by regular intervals and ordinal sampling." (Theo, p. 364)

Sampling, Distribution.—"A PROBABILITY DISTRIBUTION (theoretically expected distribution) of a statistical measure (chi-square, the product-moment coefficient of correlation r, t, a mean, or any other STATISTIC) for random samples of a specified size. The sampling distribution gives the probable distribution of values of the statistic that would be obtained if an extremely large number of random samples of a specified size were taken from the same population. In other words, while a particular sample yields a specific value for the statistic, the sampling distribution shows theoretically the probable distribution of values that would be obtained from a great many samples. At the same time it gives the probability of obtaining each specified value." (Theo, pp. 364–5)

Sampling Error.—"The difference between the true population PARAMETER and the PARAMETER ESTIMATE obtained from a SAMPLE of the POPULATION." (Theo, p. 365)

". . . the difference between the value of some statistic, such as the mean or the standard deviation calculated from a sample, and that which would have been obtained if it had been calculated on the basis of the entire population. If, for example, the score of one fourth-grade pupil in arithmetic were used as an indication of the level of achievement of the entire fourth grade, the difference between his score and the average score on the same test for all pupils in the grade would be a sampling error. Samples are seldom perfectly representative of populations. If they were, there would be no sampling error." (A, pp. 461–2)

Scale.—". . . is a sequence of numbers whose use is defined and limited so they will have special significance in indicating various degrees of some trait or characteristic. For example, the scores obtainable from any test constitute a scale. Scales are sometimes represented graphically by intervals and subdivisions of intervals along a line." (A, p. 462)

"A series of numerical units or nonnumerical categories used to measure or classify data. Scales range from NOMINAL SCALE, consisting simply of a series of nonordered categories for classifying data, to the RATIO SCALE, which is the most precise instrument for the quantitative measurement of degrees of magnitude." (Theo, p. 366)

Scaling.—"In general, scaling has been defined as 'the assignment of numerals to objects (including people), according to some rule, in order to represent their properties' (F.M. Lord 'Scaling', *Review of Educational Research,* Vol. 24, 1954. p. 375)." (G, p. 617)

Scatter Diagram.—". . . a device for displaying the relationship between scores on two tests for individuals in a particular group. Scores on one test are represented on the vertical dimension, those on the other along the horizontal dimension. A dot, tally mark, or other symbol is entered on the diagram at such a position with reference to the horizontal and vertical scales as to reflect the pair of scores for a particular individual. If the scores on the two variables are highly correlated, the tally marks on the scatter diagram tend to fall close to a straight line. A scatter diagram is sometimes used as the starting point in the calculation of a coefficient of correlation. Because each tally mark represents scores on two variables, a scatter diagram is sometimes referred to as a 'double entry table.'" (A, p. 462)

Science.—"An approach to the problem of human knowledge based on the attempt to develop general principles about a delimited range of phenomena derived from empirical observations . . . and so stated that they can be tested by any competent person. The interrelated generalizations that constitute the body of knowledge of a science do not reflect idiosyncratic, individual experiences, but rather the consensus of the scientific community. Science is based on the assumption that it is possible to derive objective knowledge about the world through the senses and the truth of this knowledge is confirmed by the similar observations of many persons. It is also based on the assumption that the biases and values of the observer can be relatively controlled so that a reasonable degree of objectivity is possible." (Theo, pp. 368–9)

". . . denotes the systematic, objective study of empirical phenomena and the resultant bodies of knowledge." (G, p. 624)

Scientific Method.—"The building of a body of scientific knowledge through observation, experimentation, generalization, and verification. The scientific method is based on the assumption that knowledge is based on what is experienced through the senses, and that if a statement concerning natural phenomena is to be accepted as meaningful or true it must be empirically verifiable. Thus any scientific law must be based on empirical evidence. The scientific method also assumes that when there are differences in what is observed, the judgment of the community of qualified experts determines which empirical observations are to be accepted. Thus individual, idiosyncratic observations not shared by other scientists are not regarded as scientific facts. Although the scientific method depends on the collection of empirical facts, it extends beyond this. Facts alone do not constitute a science. To have any meaning, facts must be ordered in some fashion, analyzed, generalized and related to other facts. Thus THEORY construction is a vital part of the scientific method. A theoretical framework provides the means for organizing and interpreting empirical observations and for relating them to previous findings of other investigators. Also, the building of a body of scientific knowledge is a cumulative process, and therefore a crucial part of the scientific method involves the interrelating of the findings of scientists working in different times and places. Although the scientific method is usually regarded as an inductive method because its purpose is to build generalizations on the basis of specific facts, in the interplay of research, theory construction, and verification, both INDUCTION and DEDUCTION are used." (Theo, p. 370)

"Specifically, the application of the scientific method to a particular problem involves the following steps. First, the problem is defined. Second, the problem is stated in terms of a particular theoretical framework and related to relevant findings of previous research. Thisd, a hypothesis (or hypotheses) relating to the problem is devised, utilizing previously accepted theoretical principles. Fourth, the procedure to be used in gathering data to test the hypothesis is determined. Fifth, the data are gathered. Sixth, the data are analyzed to determine if the hypothesis is verified or rejected. Finally, the conclusions of the study are related to the original body of theory, which is modified in accordance with the new findings. RESEARCH; SCIENCE; THEORY." (Theo, pp. 370–1)

Score.—". . . a number assigned to an examinee to provide a quantitative description of his performance on a particular test. The original raw score is often converted into a standard score or some other derived score to facilitate comparison or interpretation." (A, p. 462)

Setting.—". . . the general locale in which the sources of the data are expected to be located and in which the data collection procedures will be carried out." (Wa, p. 317)

Sigma.—". . . a character in the Greek alphabet corresponding to the Roman letter 's' which, in lower-case form (σ), is used as the symbol for the standard deviation of a distribution. In upper-case form (Σ) it indicates the arithmetic operation of addition or summation. (When a distinction between the standard deviation of a sample and that of a population is important, the Roman letter 's' is used to indicate the standard deviation of the sample.)" (A, p. 463)

Significance, Statistical.—"The PROBABILITY that an observed SAMPLE characteristic or relationship, or difference between samples, represents a true POPULATION characteristic, relationship, or difference and is not merely due to chance sampling variation. There is always a certain amount of variation among samples drawn from the same population. Tests of significance attempt to determine whether observed relationships and differences (between variables in a sample, between samples, or between a sample and a specified type of population) are merely a result of these chance differences among samples or whether they reflect characteristics of the population or populations from which the samples were drawn. If the latter is the case, repeated samples, despite the variations among them, would continue to show the same essential pattern. The level of significance refers to the degree of probability of chance that is accepted as sufficiently low to declare a relationship significant. Commonly used levels of significance are .05 and .01. A significance level of .05 (often written p .05, i.e., the probability is less than .05) means that by chance alone a relationship or difference of the observed magnitude could be expected to occur five times out of a hundred. The smaller the probability is that an observed relationship would occur by chance, the more statistically significant the relationship is. Tests of statistical significance are used to determine whether to accept or reject the null hypothesis (that there is no significance). If a relationship is judged to be significant, the null hypothesis is rejected. Statistical significance should not be confused with substantive significance. The statistical significance of a relationship, which depends on the magnitude of the relationship and the size of the sample, does not in itself tell whether the relationship has theoretical significance." (Theo, p. 380)

Significant Difference.—". . . a large enough difference between two comparable statistics computed from separate samples so that the probability that the difference may be attributed to chance is less than some defined limit. If the difference as large as the observed difference could not be expected to occur by chance more than five times in one hundred, the difference is sometimes said to be significant at the 5 percent level of confidence. The significance of a difference depends not only on the magnitude of the difference, but also upon the precision of the two measures used to obtain the difference. Hence, a difference too small to be of any significance can often be made statistically significant by the use of sufficiently large samples. Conversely, the use of very small samples can make measures so imprecise that a difference may be statistically insignificant even when it is large enough to be of considerable practical significance." (A, p. 463)

Skewed Distribution.—". . . an asymmetrical distribution in which most of the scores are closer to one end of the distribution than they are to the other. Skewed distributions ordinarily have only one mode, but the tails or extremities are unequal in length. If the longer tail of the distribution extends toward the lower end of the score scale, the distribution is said to be negatively skewed. If the longer tail extends to the higher end of the score scale, the distribution is said to be positively skewed." (A, p. 463)

Skewness.—". . . tendency of a distribution to depart from symmetry or balance around the mean." (Te, p. 5)

Sociometry.—". . . a form or field of social psychology which emphasizes the quantitative aspects of interpersonal phenomena—with special concern for the measurement of preferences." (G, p. 684)

Spearman-Brown Formula.—"A formula giving the relationship between the reliability of a test and its length. The formula permits estimation of the reliability of a test lengthened or shortened by any amount, from the known reliability of a test of specified length. Its most common application is in the estimation of reliability of an entire test from the correlation between two halves of the test (split-half reliability)." (Te, p. 5)

Split-Half Reliability Coefficient.—". . . obtained by using one-half of the items on the test, sometimes the odd-numbered items, to yield one score for an examinee and the other half of the items to yield another independent score. The correlation between the scores on these two half-tests, corrected with the aid of the Spearman-Brown formula, provides an estimate of the reliability of the total test." (A, p. 464)

Standard Deviation.—" . . . a measure of variability, dispersion, or spread of a set of scores around the mean value. Mathematically, the standard deviation is the square root of the mean of the squared deviations of the scores from the mean of the distribution of scores. The more closely the scores in a distribution cluster about the mean, the smaller the standard deviation. In a normal distribution, 68.26 percent of all the scores lie within one standard deviation of the mean." (A, pp. 464–5)

Standard Error (S.E.).—"An estimate of the magnitude of the 'error of measurement' in a score—that is, the amount by which an obtained score differs from a hypothetical true score. The standard error is an amount such that in about two-thirds of the cases the obtained score would not differ by more than one standard error from the true score. The probable error (P.E.) of the score is a similar measure, except that in about half the cases the obtained score differs from the true score by not more than one probable error. The probable error is equal to about two-thirds of the standard error. The larger the probable or the standard error of a score, the less reliable the measure." (Te, p. 5)

Standard Score.—". . . referring to any of a variety of 'transformed' scores, in terms of which raw scores may be expressed for reasons of convenience, comparability, ease of interpretation, etc. The simplest type of standard score is that which expresses the deviation of an individual's raw score from the average score of his group in relation to the standard deviation of the scores of the group. Thus: standard score (z) = raw score (x) − mean (M) divided by the standard deviation (S.D.). By multiplying this ratio by a suitable constant and by adding or subtracting another constant, standard scores having any desired mean and standard deviation may be obtained. Such standard scores do not affect the relative standing of the individuals in the group nor change the shape of the original distribution. More complicated types of standard scores may yield distributions differing in shape from the original distribution; in fact, they are sometimes used for precisely this purpose. Normalized standard scores and K-scores (as used in Standard Achievement Test) are examples of this latter group. (Te, p. 5)

Standardized Test.—". . . one which has been constructed in accord with detailed specifications, one for which the items have been selected after tryout for appropriateness in difficulty and discriminating power, one which is accompanied by a manual giving definite directions for uniform administration and scoring, and one which is provided with relevant and dependable norms for score interpretation. Standardized tests are ordinarily constructed by test specialists, with the advice of competent teachers, and are offered for sale by test publishers. Unfortunately not all tests offered as standardized tests have been prepared as carefully as the foregoing description suggests." (A, p. 465)

Statistic.—". . . a number used to describe or characterize some aspect of a sample. . . . Corresponding to every statistic in the sample there is a parameter in the population." (A, pp. 465–6)

Statistical Model.—"A set of assumptions underlying a statistical test. Every statistical test assumes that certain conditions are met. Usually these assumptions refer to the form of the data, the nature of the sample, the nature of the population from which the sample was drawn, and the character of the variables being studied. The test is valid only if these conditions are met, and then it is important to know the statistical model on which a test is based before that test is used." (Theo, p. 413)

Statistical Test.—"A procedure used with quantitative SAMPLE data to estimate the probable truth of a hypothesis about the population from which the sample was drawn. The formulas used are based on certain principles, assumptions, and rules of mathematical logic. A wide range of statistical tests is available for a variety of purposes and various types of data." (Theo, p. 414)

Statistical Validity.—". . . of scores from a test, or any other measures, is ordinarily indicated by the coefficient of correlation between those scores and appropriate criterion measures. For example, the statistical validity (predictive validity) of an aptitude test is expressed by the coefficient of correlation between the scores of students on the aptitude test and their subsequent scores on some good measure of achievement." (A, p. 466)

Statistic(s).—". . . a number used to describe or characterize some aspect of a sample. For example, the number of cases in the sample, the mean value of the measures in the sample, the standard deviation of those measures, and the correlation between two sets of measures for the members of the sample are statistics. Corresponding to every statistic in the sample there is a parameter in the population." (A, pp. 465–6)

"Summary measures, such as percentages, means, medians, percentiles, and standard deviations, that are computed from measurements obtained from a sample of the total population. Estimates of population parameters." (A&L, p. 711)

Stochastic Process.—"A series of systematically changing probabilities of the occurrence of a particular event through time. The occurrence of an event is regarded as a PROBABILITY function of its occurrence at earlier periods. One type of stochastic process is known as a Markov chain or process. In a Markov chain, all previous periods of time are ignored except the one immediately preceding the event being analyzed, and the probability of the event is regarded as solely a function of the probability of the immediately preceding stage." (Theo, p. 420)

Stratification.—". . . denotes the process of placing any set of items along a continuum and the grouping of those items which share a relatively common position on the continuum. . . ." (G, p. 695)

Subjective Method.—"In the analysis and evaluation of data, the application of principles that the scholar feels are justified on the basis of his knowledge but that are not completely objectively verifiable. Where there is no absolute evidence pointing to a particular solution of a problem, the scholar may marshal all of his knowledge, training, and analytical skills to reach an answer or evaluation." (Theo, p. 424)

Survey.—"Nonexperimental research conducted in a natural setting in which there is less control over the study subjects and the setting than in an experiment." (A&L, p. 711)

Systematic Sampling.—". . . the sampling employed whenever 'a sample is obtained by some systematic method, as opposed to random choice; for example, sampling from a list by taking individuals at equally spaced intervals—or sampling from an area by determining a pattern of points on a map' (M.G. Kendall and W.R. Buckland, *A Dictionary of Statistical Terms*, p. 288) Raymond V. Bowers." (G, p. 615)

T Test.—"A statistical test used to determine the PROBABILITY that a STATISTIC (summarizing value for a sample) obtained from SAMPLE data is merely a reflection of a chance variation in the sample(s) rather than a measure of a true population PARAMETER. In other words, t, which is based upon the ratio of a statistic to its STANDARD ERROR, is used to determine the level of significance of a statistic of a certain size obtained from a sample of a certain size. The t test is used instead of the CRITICAL RATIO when the size of the sample is small. The SAMPLE DISTRIBUTION of t, sometimes referred to as Student's distribution or Student's t distribution, does not exactly coincide with a normal frequency distribution curve because, with a small sample, the probability of more extreme deviations is greater than with a large sample. As the size of the sample increases, the distribution of the distribution of t approaches a normal curve. With very large samples the t distribution becomes a normal probability curve. The calculation of t for any statistic takes into account the size of the sample from which the statistic was obtained." (Theo, p. 433)

"A parametric statistical test for small samples based on student's t-distribution. It can be used to test the significance of the difference in the values of summary measures for two samples. Significance is assessed by determining whether this difference exceeds the amount that could be attributed to random sampling. If it does not, the two sample summary measures can be considered to be independent estimates of the same population parameter and the two samples as having been drawn from the same population . . . in a form of the following ratio (under the null hypothesis the difference in population means is considered to be zero): difference in sample means minus difference in population means divided by the standard error of the difference in sample means. When the number of sampling units is large, the test is known as the T-test and is based on the normal rather than the t distribution." (A&L, p. 712)

Test.—". . . a general term used to designate any kind of device or procedure for measuring ability, achievement, interest, and other traits. A test is also defined as any systematic procedure for comparing the behavior of two or more persons. In ordinary speech, the terms 'examination,' 'quiz,' and 'test' are often used interchangeably. However, the term 'quiz' ordinarily refers to something short and informal, the term 'test' to a longer more carefully prepared series of questions, and the term 'examination' to a very comprehensive process. (A, p. 466)

Test-Retest Reliability.—". . . is calculated by correlating scores for the same students on two administrations of the same test. The size of a test-retest reliability coefficient indicates not only the precision of measurement of the test, but also the stability of the trait being measured. Test-retest reliability coefficients do not indicate how adequately or representatively the items in the test sample the whole field to be covered by the test. Hence, retest reliability coefficients are usually higher than equivalent forms reliability coefficients. In general, the greater the interval between test and retest, the lower the retest reliability coefficient will be. Because of practice effects and the difficulty in maintaining motivation when examinees are asked to take the same test the second time, retest reliability coefficients are calculated less frequently than other types." (A, p. 467)

Theory.—"Summarizes existing knowledge, provides an explanation for observed facts and relationships, and predicts the occurrence of as yet unobserved events and relationships on the basis of explanatory principles embodied in the theory. Scientific theory is composed of definitions, postulates, and deductions." (A&L, p. 712)

"1. A set of interrelated principles and definitions that serve conceptually to organize selected aspects of the empirical world in a systematic way. A theory includes a basic set of assumptions and axioms as the foundation, and the body of the theory composed of logically interrelated, empirically verifiable propositions. Although usage varies, the propositions that comprise a theory may be regarded as scientific laws if they have been sufficiently verified to be widely accepted, or as hypotheses if they have not been that well verified. In either case the propositions that comprise a theory are constantly subject to further empirical testing and revision. Through the process of DEDUCTION a theory provides specific hypotheses for research, and through INDUCTION research data provide generalizations to be incorporated into and to modify a theory." (Theo, pp. 436–7)

Trait.—". . . is any attribute of persons which is possessed in differing amounts by different members of a group or class. It is a physical characteristic or a relatively stable mode of behavior. Such things as height, intelligence, quality of handwriting, or understanding of chemical principles are traits." (A, p. 467)

True-False Item.—"A test question or exercise in which the examinee's task is to indicate whether a given statement is true or false." (Te, p. 6)

Two-Tailed Test.—"A STATISTICAL TEST used to test a hypothesis when the direction of the difference between samples or relationship between variables is not predicted in the hypothesis. That is, the null hypothesis merely states that there will not be significant difference between the samples, or relationship between the variables, and the alternative hypothesis does not specify which sample will be further in a given direction (score higher, be more favorable, etc.) if there is a difference, or if there is a relationship between the variables whether it will be positive or negative. The term 'two-tailed' refers to the fact that there is a REGION OF REJECTION of the null hypothesis at both ends (or tails) of the SAMPLING DISTRIBUTION. (Theo, p. 444)

Total Actual Time.—"Total work period in minutes covered by the study, minus scheduled periods and lunch periods." (Bar, p. 211)

Unmeasured Work.—"Productive work which is not included in the normal time. In most studies, only the repetitive elements occurring at least once a cycle were included in the normal time. For example, such elements as inspect work, line trays, and record production, which occur only infrequently, were omitted from normal time. These exclusions were made to simplify the study and to increase the probable accuracy." (Bar, p. 212)

Validity.—"The extent to which a test does the job for which it is used. Validity, thus defined has different connotations for various kinds of test and, accordingly, different kinds of validity evidence are appropriate for them. . . . The traditional definition of validity as the extent to which a test measures what it is supposed to measure, seems less satisfactory than the above, since it fails to emphasize that the validity of a test is always specific to the purposes for which the test is used, and that different kinds of evidence are appropriate for appraising the validity of various types of tests. (Te, p. 6)

Validity of Measurement.—To validate performance sampling as a method of measuring work, the normal time established by performance sampling is compared with the corresponding normal time by the time study. (Bar, p. 198)

Variable.—". . . is a measurable or potentially measurable component of an object or event that may fluctuate in quantity or quality, or that may be different in quantity or quality from one individual object or event to another individual object or event of the same general class. (Wa, p. 318)

". . . characteristic, property, trait, or attribute of the person or thing observed in a study. Variables must have a scale of measurement possessing at least two mutually exclusive values and must give rise to statistical data." (A&L, p. 712)

"In statistics, a characteristic that is common to a number of individuals, objects, groups, events, etc., and that has different degrees of magnitude or different categories (for example, positive or negative) so that individual cases differ in the extent to which they possess the characteristic (expressed in numerical values) or in the CATEGORY of the characteristic into which they fall. In a controlled experiment certain variables may be made into constants by being made uniform for all the subjects being studied so that the relationship of other variables, usually the independent and dependent variable, may be more accurately observed and tested." (Theo, p. 457)

"An independent variable (also called the X variable) is one whose occurrence or change results in the occurrence or change in another variable (the dependent variable). In terms of the cause-effect schema, the independent variable is the cause. In a controlled experiment the independent variable is the experimental variable, that is, the variable introduced into the experimental group and withheld from the control group. When the values of an independent variable are known, they may be used to predict the values of the variable that is dependent upon it."

"A dependent variable (also called the Y variable) occurs or changes in a regular determinable pattern related to the occurrence of or changes in another variable or variables. In terms of the cause-effect schema, the dependent variable is the effect." (Theo, p. 457)

Variance.—". . . a measure of the dispersion of scores about their mean. The variance is the mean of the squared deviations of the scores from their mean. Hence, it is equal to the square of the standard deviation." (A, p. 468)

"A measure of dispersion of statistical values that is the arithmetic mean of the squared deviations from the mean. It is obtained by subtracting each value of the FREQUENCY DISTRIBUTION from the arithmetic mean of the distribution to obtain the deviations from the mean. Each deviation is squared (thus eliminating positive and negative signs). The arithmetic mean of these squared deviations is the variance. Thus the variance is the STANDARD DEVIATION squared. It is usually symbolized by σ^2. (Theo, p. 459)

Variance, Analysis of.—"The analysis and comparison of the variances in two or more samples to determine whether or not the samples probably are from the same POPULATION, or put in other words, either there is a statistically significant difference between two or more samples. The techniques for analyzing VARIANCE provide a means of analyzing the relationship between a qualitative variable (or variables) and a quantitative variable. The separate samples represent a division of the cases on the basis of a qualitative variable or variables. (Usually other relevant variables are controlled.) The distribution of the quantitative variable within each of these divisions (samples) is then compared by means of techniques using variance." (Theo, p. 459)

Weighted Scoring.—". . . the number of points awarded for the correct response is not the same for all items in the test. In some cases, weighted scoring involves the award of different numbers of points for the choice of different responses to the same item." (A, p. 468)

Work Sample Test.—". . . a performance test which provides a controlled tryout of the examinee's behavior under conditions as similar as possible to those he will encounter in a work situation. In a work-sample test the relevance of the tasks is high." (A, p. 468)

Work Sampling.—Is a fact finding tool. It is "based on the laws of probability" in that a small random sample tends to have the same distribution pattern that is present in the entire group that is sampled. (Bar, p. 41)

All Day Stop Watch Time Study.—". . . a continuous study (sometimes called production study) which is the most common method for obtaining complete information about the activities of a man, a machine, or process equipment." (Bar, p. 3)

Operational Research Terms

Algorithm.—". . . a name that is sometimes used for iterative solution procedures." It is a common name for solution procedures used in obtaining an optimal integer linear programing model. The algorithm requires that all new variables must also be integers. These algorithms have been inefficient for most problems, requiring a prohibitive amount of electronic computer time even to solve small problems involving only a few constants and a few variables. (Hi, p. 555)

Assignment Problem.—One of three types of linear programing problems. The assignment problem is a special case of the transportation problem which is a special part of the general linear programing problem. However, its simple structure can be solved more efficiently by our solution procedures. The mathematical formulation of the transportation problem reduces to the assignment problem when the number of sources equal the number of destinations and each demand equals ones. (Hi, p. 198)

Assumption.—". . . statements of suppositions concerning the state of an object, attribute, or relationship. Suppositions are hypotheses or postulates. When the supposition is false, the assumption is false, and the condition of the problem is contradictory. Assumptions are used to deal with difficult realities that tend to upset the problem-solving routine. When assumptions do not change the level or risk or alter the cost-effectiveness relationship of an alternative they are useful, essential parts of a problem. Assumptions place a burden of consistency on the analyst. An assumption infers the existence of a fact, not known with certainty, from the known existence of other facts." (Op, p. 89)

Boundary.—". . . prescribes a limitation within which the objects, attributes and their relationships are adequately explained and manageable. . . . boundaries may be defined simply if the objects are absolute or finite in nature." (Op, p. 28)

Capabilities.—". . . the intrinsic abilities of men or equipment to perform system tasks. For example, a system requirement to take a reading every second from a heat-recording instrument cannot be performed effectively by man. . . . Capabilities vary with requirements for speed, reliability, accuracy, and frequency of processing. The capability of a given system will ultimately rest upon its fitness to adapt to the condition it is required to service." (Op, p. 32)

Central Limit Theorem.—Describes the tendency that the distribution of the sums of random variables will tend toward normality even if the random variables themselves are not normally distributed. (Op, p. 66)

Closed Systems.—". . . operate with relatively little interchange of either energy or materials with the environment." For example, "a monopoly whose processes and products are protected by patents and other capabilities." (Op, p. 30)

Complements.—". . . the application of an 'intensive' to a system . . . these vary in terms of numbers and capabilities of men or machines." (Op, p. 32)

Conclusion.—". . . an inference drawn from two or more propositions that are taken as a premise." (Op, p. 20)

Condition.—". . . the requisite provision that stipulates by its limitations and description, the character of a system." (Op, p. 14)

Consistency.—". . . describes a number of attributes: congruity, coherence, uniformity and lack of contradiction. Consistency implies congruity; for example, the same system may be operated twice in exactly the same fashion. If the experiment is consistent, the operations are superimposable, as are the results of the operations. Consistency is obtained through the unformity of content, procedure, and program. The essence of uniformity is its nonvarying state and its internally homogeneous condition. Consistency relies upon the lack of contradiction." (Op, p. 17)

Criterion.—". . . the means by which an alternative is measured or chosen. . . . it enables the analyst to show consistency in his preference selection. The criterion will illustrate the relative achievement of an alternative in terms of other yardsticks, such as time, cost, or effectiveness. A criterion is a standard by which a judgment can be made about the relative merits of a choice." (Op, p. 89)

Critical.—". . . the change in system parameter, where a property crosses a threshold and assumes a finite value of a different order. Critical levels result from wide variations in the properties of parameters outside the range provided through system design." (Op, p. 27)

Data.—". . . a magnitude, figure, or relationship to be introduced into, or to be derived from, the operation of a system. Data may also be nonnumerical; e.g., facts, principles, statements, or other material upon which arguments are based." (Op, p. 13)

Distribution.—Process by which specific functions, required for the attainment of the purpose of the system, are assigned to selected components. (P, p. 88)

Dynamic Programing.—". . . a mathematical technique often useful for making a sequence of interrelated decisions. It provides a systematic procedure for determining the combination of decisions which maximizes overall effectiveness." There is no standard mathematical formulation of the dynamic programing problem as there is for linear programing . . . "Dynamic programing is a general type of approach to problem solving." (Hi, p. 239)

Effectiveness.—". . . the extent of accomplishment in producing a result, as evaluated following the execution of an action. Effectiveness is relative, since the suppliers of motive and executors of tasks are human beings." (Op, p. 6)

Environment.—". . . a set of all objects, within some specific limit, that may conceivably have bearing upon the operation of the system." (Op, p. 28)

Evaluation.—". . . the appraisal of discriminated information for the purpose of understanding its underlying meaning and the rationality of its content." (Op, p. 60)

Evidence.—"A body of knowledge widely confirmed by observation." (Op, p. 5)

Game Theory.—". . . mathematical theory that deals with the general features of competitive situations like those in a formal, abstract way." It emphasizes the decision-making process of the adversaries. (Hi, p. 265)

Information.—". . . the knowledge derived through the analysis of data." (Op, p. 13)

Integration.—A process in which the objects "may only be defined in the context of the subsystem or system to which they belong." (Op, p. 40)

Intelligibility.—". . . the property of being definitely and clearly understood." (Op, p. 68)

Intensives.—". . . the amounts of capital, labor, materials, or equipment provided for system operation. Intensives are increased to augment the rate or effectiveness of system performance. One intensive may be increased without decreasing others; intensives may be varied 'up or down,' depending upon the intrinsic range of the parameter property." (Op, p. 32)

Intervention.—". . . the means of changing an existing state by energizing a force to alter the existing state." (Op, p. 42)

Inventory Models.—". . . classified into two categories, depending upon whether the demand for a period is known . . . or whether it is a random variable having a known probability distribution. . . ." (Hi, p. 359)

Known.—". . . a quantity whose value is established." (Op, p. 73)

Linear Programing.—". . . deals with the problem of allocating limited resources among competing activities in an optimal manner. This problem of allocation can arise whenever one must select the level of certain activities which must compete for certain scarce resources." Linear programing can be applied to a variety of situations. ". . . a mathematical model is used to describe the problem . . . 'linear' means that all the mathematical functions in this model are required to be linear functions . . . linear programing involves the planning of activities in order to obtain an 'optimal' result; i.e., a result which reaches the specified goal best (according to the mathematical model) among all feasible alternatives." (Hi, p. 127)

Methodology.—". . . a logically and procedurally organized arrangement of steps. When formally documented or utilized, these steps may constitute a science of method for whatever discipline that uses them." (Op, p. 19)

Network Theory.—". . . involves allocating flows in order to maximize the flow through a network connecting a source and a destination." (Hi, p. 208)

Observation.—". . . the process by which data are identified with a system for subsequent explanation of that system." (Op, p. 5)

Operations research.—". . . is concerned with decision making for situations which originate from real life. . . . The contribution of operations research approach stems primarily from the following: (1) The structuring of the real life situation into a mathematical model, abstracting the essential elements so that a solution relevant to the decision-makers objectives can be sought. This involves looking at the problem in the context of the entire system. (2) Exploring the structure of such solutions and developing systematic procedures for obtaining them. (3) Developing a solution that yields an optimal value of the system measure of desirability (or possibly comparing alternative courses of action by evaluating their measure of desirability)." (Hi, p. 6)

Optimum.—". . . best in the sense of 'all things considered.' It does not mean 'the very best.' It may mean the most favorable condition conducive to a given objective." (Op, p. 93)

Output Model.—". . . are postulated to occur in all systems and at all subsystem levels. There is an output model for a process-oriented solution and for an outcome-oriented solution. The content of the output model in the process-oriented solution is specific. The output model for the outcome-oriented solution is more general; the output model in this instance may draw upon the processes that are assumed to operate in the total system, but which are not stated in detail." (Op, p. 53)

Physical.—". . . deals with hardware, equipment, machinery, and in general, real objects or artifacts. These systems may be contrasted with abstract systems." (Op, p. 28)

Problem.—". . . a situation in which there are two states: One is characterized by the present state, the other by a proposed state. The present state is exemplified by the existing system; the proposed state is exemplified by the system that is hypothesized (desired) or proposed. In both states, there is a set of objects, attributes and relationships interlocked in a process." (Op, p. 73)

Problem-Solving.—". . . the activity that maintains or improves system performance." (Op, p. 3)

Process.—". . . the totality of components encompassed by all objects, attributes, and relationships to produce a given result. Processes may be mental (thinking, planning, learning), mental-motor (testing, writing, constructing) or mechanical (operating, functioning). Processes apply to men or machines and their combined activities. Systems may be identified by their processors or processes. No system, within the definition of this presentation, may be said to exist without a process." (Op, p. 27)

Process Orientation.—". . . conceives the problem as intrinsically complex, irrespective of its apparent simplicity. The process orientation requires that a problem be divided into its components, serially related parts. In this manner, a problem would be broken into manageable segments, to be formally restructured for solution." (Op, p. 8)

Quality Control.—". . . monitoring of a system and its planned change by which adjustments are introduced to correct for differences between actual output performance and performance expectations established by objectives." (B, p. 90)

Queuing Theory.—". . . the mathematical study of 'queues' or waiting lines. The formation of waiting lines is, of course, a common phenomenon which occurs whenever the current demand for a service exceeds the current capacity to provide that service. . . . the ultimate goal is to achieve an economic balance between the cost of the service and the cost associated with waiting for that service." (Hi, p. 285)

Relationship.—". . . the bonds that link objects and attributes in the system process. Relationships are postulated among all system elements, among system and subsystems, and between two or more subsystems. Relationships may be characterized as first order, when they are functionally necessary to each other. . . . Relationships may be characterized as second order if they are complementary, adding substantially to system performance when present, but not functionally essential. . . . Relationships may be characterized as third order when they are either redundant or contradictory." (Op, p. 27)

Reliability.—". . . establishing confidence, limits, or probability of occurrence" of a solution. (Op, p. 16)

Risk.—". . . the measure of potential exposure to system failure. High risk may also be characterized by low statistical probability, although precise measures of risks are not always quantifiable." (Op, p. 89)

Simulation.—Provides the only practical approach to a problem if it is so complex that it cannot be solved analytically. The simulation model "involves the construction of a model which is largely mathematical in nature" and "describes the operation of the system in terms of individual events of the individual components of the system." (Hi, p. 439)

Solution.—". . . states how the gap between existing and desired states will be closed . . . therefore, it is an intermediary between existing and desired states that implements the transformation from one state to another. The solution prescribes the differences that exist between the two states in terms of the objects, attributes, and relationships. . . . Solutions are operationally implemented through the mechanism of feedback control." (Op, pp. 74–5)

Standard.—". . . a nonsubjective means of stating what a relationship should be, in terms of authoritative criteria embodying specific rules or principles." (Op, p. 9)

Stochastic Inventory Models.—". . . concerned with inventory problems where the demand for a period is a random variable having a known probability distribution. . . . the stochastic process . . . can represent the collection of daily inventory levels of a given product, or it can represent the collection of daily demands for this product." (Hi, pp. 370 and 402)

Subsystems.—"The component processes necessary to the operation of a total system." (Op, p. 28)

System.—"The device for examining the process of problem solving. . . . a more complete and inclusive general definition would present a system as a set of objects with a given set of relationships between the objects and their attributes." (Op, pp. 5 and 26)

System Parameters.—"The parameters of a system are input, process, output, feed-back control, and a restriction." (Op, p. 36)

Systems Analysis.—". . . the formal examination of alternative system designs." (Op, p. 71)

Systems Approach.—"Common sense by design. A self-correcting and logical methodology of decision making to be used for the design and development of man-made entities. Component strategies of this methodology include the formulation of performance objectives, the analyses of functions and components, the distribution of functions among components, then scheduling, the training and testing of the system, installation, and quality control." (B, p. 91)

The Simplex Method.—". . . the name that has been attached to a method for solving any linear programing problem. This method is an algebraic procedure which progressively approaches the optimal solution through a well-defined iterative process until optimality is finally reached. The procedure is straightforward and requires only time and patience to execute it manually. . . . well suited for an electronic computer." (Hi, p. 138)

Trade-off.—". . . describes how objects and attributes are methodically manipulated to determine the full range of system characteristics." (Op, p. 105)

Unknown.—". . . quantities whose values are sought. Thus, to define one unknown in terms of another might be contradictory or redundant. Unknowns may only be expressed in terms of knowns whose objects, attributes, and relationships are established." (Op, p. 73)

Utility.—". . . represents the combined value of the time-cost effectiveness evaluation." (Op, p. 104)

Health Care and General Terms

Ability.—"A quality possessed by an individual that enables him to perform an act, solve a problem, or make an adjustment. Ability refers to potential performance, that is, whether or not an individual can at a given time act in a specified manner or learn certain skills or knowledge. It is not used with reference to the source or the individual's potentiality for accomplishment. Whether this potentiality is based on inherited traits or previous learning, or a combination of both, is irrelevant. Intelligence tests are tests of ability." (Theo, p. 1)

Abstract.—"A miniature embodiment of the work of an author, sometimes using his own words. An abstract of a research report consists of: '(1) a short definition of the problem; (2) a brief exposition of the methods and procedures employed in gathering the data; and (3) a condensed summary of the findings.' " (L, p. 2)

Activity.—"Observable physical action. One of the three principal concepts used by George C. Homans in his analysis of groups. (G.C. Homans, *The Human Group*, Harcourt, Brace, New York, 1950)." (Theo, p. 5)

". . . any similar process actually or potentially involving mental functions; specif: an educational procedure designed to stimulate learning by first-hand experience." (W, p. 10)

Administration Activities.—"Activities which involve responsibility for planning and providing effective patient care; for the development of unit personnel; and for management and operation of the nursing unit." (USPHS #370, p. 2)

Annotation.—"A comment indicating its value and relationship. 'At its best, it will consist of a brief exposition of the nature and content of its work, its relationship to the present study, and perhaps, any use that may be made of it by the reader.' " (Campbell, p. 10, L, p. 2)

Approach.—". . . a preliminary step or manner of advance." (W, p. 43)

Architecture.—"The art or practice of designing and building structures . . ." (W, p. 46)

Art.—"(1) The expression of perceptions and emotions in an aesthetic form that conveys meaning and similar feeling to others. Art forms are always culturally standardized to some extent, but within the cultural framework the amount of individual expression permitted varies greatly from one culture or historic period to another. Art tends to reflect societal values. However, in a complex society some forms of aesthetic expression reflect the values of a specialized group of artists. (2) Skill in performing a task that results from a combination of knowledge, experience, and the understanding of the subtle influences of a variety of factors. The task itself may be relatively concrete or abstract; for example, art may be embodied in both carpentry and teaching." (Theo, p. 16)

Assistant Head Nurse.—"The nurse who has full-time responsibility for assisting the head nurse and who assumes responsibility for management of the unit in the absence of the head nurse." (USPHS #370, p. 3)

Assumption.—"A statement whose correctness or validity is taken for granted." (A&L, p. 698)

". . . a statement describing a fact or condition that is accepted as being true on the basis of logic and reason. The reason for accepting the conditions on this basis is so that the investigator may get on with the study he wishes to do without having to stop to demonstrate that the stated conditions are indeed as logic or reason would lead knowledgeable people to believe them to be." (Wa, p. 313)

Books or Monographs.—"A set of printed sheets of paper, bound between covers, forming a volume, usually published by a university or commercial press." (L, p. 3)

Case Study Method.—". . . consists of a mode of analysis rather than a set of research procedures. It is 'an approach which views any social unit as a whole' (W.J. Goode and P.K. Hatt, *Methods in Social Research,* New York: McGraw-Hill, 1952, p. 351). . . . it has been suggested that the value of the case study method lies in its effort to discover all variables relevant to a given case. It tries to convey an understanding of a class or type of phenomena by the full description and detailed analysis of one or a series of cases belonging to that class. . . . the case method has been deemed of particular value in exploring the individual's values, attitudes, and definitions of situations. The type of data and research procedures usually linked with the case study method reflects this interest in the relationship between individual behavior and the social context. . . ." (G, p. 74)

CASH.—A nonprofit corporation formed in 1963, is "an outgrowth of work done in individual hospitals by different management consultant groups." The nine-member board is composed of "representatives from the Hospital Council of Northern California, the Hospital Council of Southern California, and Blue Cross of Southern California. . . . In exchange for the services of CASH, member hospitals pay a base fee of fifty dollars per month plus thirty-five cents per bed. The maximum fee any hospital pays is two hundred and fifty dollars per month. . . . CASH depends on a grant from W.K. Kellogg Foundation for fifty percent of its income." CASH offers management consultant services in the area of personnel utilization and quality control levels to be established on a departmental level. CASH holds a monthly area conference at one hospital in each of the 14 geographic regions of California. (Ki, pp. 5–8)

Category.—". . . denotes either a name given to any class of things, actions, or relationships which recur with sufficient (relative) uniformity and frequency as to render the class a useful subject of a predication." It is also used as a classificatory term. (G, p. 77)

Classical Economic Theory.—"A body of economic theory developed primarily in England in the eighteenth and nineteenth centuries, and associated with such men as Adam Smith, David Ricardo, Thomas R. Malthus, John Stuart Mill, Jeremy Bentham, and others. It was based on the assumption that man's behavior is essentially rational and governed by the attempt to attain his self-interest. The classical economists generally supported the idea that the pursuit of self-interest by the individual members of society in a free economic system would lead to the greatest possible prosperity for the society. They therefore supported private property and individual economic freedom, and tended to favor the limiting of government interference in the economic realm to minimal and clearly necessary functions." (Theo, p. 52)

Classification.—". . . assign each item or specimen given to the appropriate category or class. Or this task may be to decide whether a particular item does or does not belong in a particular class. The items to be classified may consist of names, descriptive phrases, pictures, statements, etc. The categories or classes . . . may be defined for him, or he may be required to infer the appropriate definition from the examples of items belonging in the class." (A, pp. 446–7)

Clerical Activities.—Activities concerned with "counting, copying, ordering, and recording." (USPHS #370, p. 21)

Clerk.—"Ward clerk responsible to nursing service." (USPHS #370, p. 3)

Comparison.—". . . the juxtaposing of items to establish similarities and dissimilarities." (W, p. 168)

Complex.—"A whole made up of complicated and interrelated parts." (W, p. 170)

Cyclical Staffing.—". . . a technique by which the various hourly schedules can be equitably distributed among personnel; hours can be known in advance; and the schedules can be continuously repeated." (P, p. 6)

Definition, Real.—"A definition that is a proposition about the essential nature of a given phenomenon. A real definition can be regarded as 'a hypothesis concerning the nature of the phenomenon under investigation.' It is 'a universal affirmative proposition . . . no real definition of any concept in any field can be constructed without empirical knowledge of the phenomenon in question.' (R. Bierstedt in *Symposium on Sociological Theory,* edited by L. Gross, Row, Peterson. Evanston, Illinois, 1959)." (Theo, p. 105)

Dietary Activities.—Activities involved in "routine serving of fluids, food, and nourishment." (USPHS #370, p. 21)

Dietary Maid.—"Nonnursing personnel responsible for care of the unit diet kitchen and for serving and carrying trays to and from the patient's bedside under the supervision of the nursing department." (USPHS #370, p. 3)

Direct Patient Care.—". . . those nursing acts which ordinarily are controlled by the nursing personnel. In most instances, the nursing staff on the ward control the initiation of these acts, their quality, the number of times they are performed, and the amount of time devoted to the performances of a particular act." These "activities are performed in the immediate presence of the patient." (K, p. 9)

Distributive Care.—"That area of concentration in nursing practice which emphasized prevention of disease and maintenance of health and is largely directed toward continuous care of persons not confined to health care institutions." (AAA, p. 166)

Economics.—"The scientific study of the production, distribution, and consumption of foods and services." (Theo, p. 126)

Education.—"The transmission of knowledge by either formal or informal methods. The concepts of *socialization* (the process by which a child learns the culture of his group) and *learning* are related to, in fact often inseparable from, the concept of education. Although education is often thought of in terms of schooling (formal education), effective training for the individual's role as both a group member and an autonomous person is a constant process." (Theo, p. 127)

Element.—". . . a constituent part: as a pl: the simplest principles of a subject of study." (W, p. 267)

Episodic Care.—"That area of concentration in nursing practice which emphasizes the curative and restorative aspect of nursing and which usually involves patients with diagnosed disease, either acute or chronic." (AAA, p. 166)

Extended Care Facility.—". . . an institution . . . which has in effect a transfer agreement . . . with one or more hospitals and agrees to ten requirements such as type of care provided, review of policies, type of staff, type of supervision, maintenance of records, type of 24 hour coverage, procedure for drug review, licensing procedures and other conditions relating to health and safety of individuals." (PL, pp. 317–8)

Extended Care Services.—The services furnished to an inpatient of an extended care facility and include nursing care provided under supervision of registered nurses; bed and board; physical, occupational or speech therapy; medical social services, drugs, biological, supplies, appliances, equipment, medical services and other services necessary to the health of the patient. (PL, p. 316)

Float.—". . . an employee who is not permanently assigned to any one station." (P, p. 39)

Group.—"A number of persons constitute a group insofar as a specified type of integration occurs among them, and to the degree of such integration." (G, p. 296)

"(1)A plurality of persons who have a common identity, at least some feeling of unity, and certain common goals and shared norms. A group is further characterized by direct or indirect communication among its members, standardized patterns of interaction based on a system of interrelated roles, and some degree of interdependence among members. According to this usage, a group is a more developed type of *collectivity* with a distinct sense of identity and a definite social structure based on direct or indirect interaction among its members. Groups range in size and degree of intimacy from a family to a society." (Theo, p. 176)

Guide or Manual.—"A book or pamphlet that explains, outlines, or gives a practical approach to resolving problems on some subjects. The outline may include exhibits of materials that are helpful in describing or in explaining the approach." (L, Exhibit 1)

Head Nurse.—"The nurse who has full-time responsibility for administration of the nursing unit during her tour of duty." (USPHS #370, p. 3)

Hospital Attendant.—Members of the nursing team that care for patients, under the direction of registered professional nurses and licensed practical nurses, performing a variety of duties, most requiring little specialized training but all contributing to the comfort and care of patients. (00, p. 89)

Housekeeping Maid.—"Nonnursing personnel whose major functions in the unit are housekeeping and general cleaning of service rooms, under the general supervision of the nursing department." (USPHS #370, p. 3)

Indirect Patient Care.—". . . those activities which are not performed in the immediate presence of the patient." (K, pp. 12 and 19)

Inpatient Unit.—"Is the area under the administration of a head nurse or charge nurse." (USPHS #370, p. 2)

Inservice Education.—"A program administered by the employer that is designed to upgrade the knowledge or skills of the agency's own employees." (AAA, p. 166)

Institution, Total.—"A place of confinement or partial confinement where persons of a specified type live, following a formalized life routine under the control and direction of a bureaucratic staff, and having limited contact with the rest of society. Examples of total institutions are prisons, hospitals, army camps, boarding schools, etc." (Theo, p. 207)

Labor.—"1. As a general term, any work or effort directed toward the attainment of a specific goal." (Theo, p. 223)

Leadership.—"Denotes the occupancy of a status (q.v.) and the active performance of a role that mobilizes more or less organized collective and voluntary effort toward the attainment of shared goals and objectives." (G, p. 380)

Levels of Activities.—". . . differentiated in this study on the basis of the degree and kind of skill, training, authority, and responsibility required to perform the activity successfully and efficiently. (USPHS #370, p. 2)

Licensed Practical Nurse.—Assists in caring for patients under the direction of physicians and registered nurses. "They provide nursing care which requires technical knowledge but not the professional training of a registered nurse." The licensed practical nurses are known as licensed vocational nurses in California and Texas. "All States and the District of Columbia regulate the licensure and preparation of practical nurses." (00, pp. 93–4)

Management.—"The process of planning, organizing, coordinating, and directing the productive process in an economic enterprise. The term is also applied to those persons, organized in a hierarchy, who carry out the management process, that is, who perform these tasks or functions." (Theo, p. 240)

"Management denotes the process of formulating and executing business or industrial policy through the functional activities of planning, organization, direction, co-ordination, and control." (G, p. 403)

Management, Middle.—"The intemediate level of management excluding the top executives on the one hand and the first-line supervisors on the other hand . . . sometimes referred to as junior executives, line officials, or line officers." (Theo, p. 241)

Medlars.—"Medical Literature Analysis and Retrieval System (1964) is a computer-based bibliographic system making possible the publication of an index to the published medical and related literature and the retrieval of specialized bibliographic information on both recurring and demand bases." (A&L, p. 704)

Messenger.—"Activities involved in transport services, escort services and errands." (USPHS #370, p. 2)

Messenger, Activities.—"Activities of nonnursing personnel responsible for all errands that are done off the unit under the supervision of the nursing department." (USPHS #370, p. 2)

Monograph.—"A learned treatise on a small area of learning." (W, p. 548)

Non-Empirical.—". . . used to describe all of acquiring belief other than those of positive science or its rough equivalents in everyday life." (G, p. 471)

Nurse.—A general term to describe "one skilled or trained in caring for the sick or infirm, esp. under the supervision of a physician." (W, p. 580)

Nursing.—"It is a service to individuals and to families, therefore to society. It is based on an art and science which mold the attitudes, intellectual competencies, and technical skills of the individual nurse into the desire and ability to help people, sick or well, cope with their health needs." (A&L, p. 705)

". . . primarily complementing the patient by supplying what he needs in knowledge, will, or strength to perform his daily activities and to carry out the treatment prescribed for him by the physician." (H, p. 21)

Nursing Activity.—"Direct and indirect activities involved in giving nursing care to patients." (USPHS #370, p. 2)

Nursing Aide.—"Nonprofessional nursing personnel, trained on the job, who assist the nursing staff in giving patient care." (USPHS #370, p. 3)

Nursing Function.—". . . to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to peaceful death) that he would perform unaided if he had the necessary strength, will, or knowledge. And to do this in such a way as to help him gain independence as rapidly as possible." (H, p. 15)

Opinion.—"(1) A conclusion or judgment about a specific event, object (including a person or group), or situation. An opinion is a very specific manifestation of an ATTITUDE in relation to a particular problem. For example, a person may have an attitude favoring maximum public support for education and an opinion that the local school tax in his community should be raised immediately. (2) A verbal expression of an attitude." (Theo, p. 284)

"An *opinion* is a judgment, conviction, view, or belief held by a person on some issue." (G, p. 477)

Orientation.—The process of becoming acquainted with the existing situation or environment. (Not direct quote.) (W, p. 595)

Organization, Formal.—"(1) A highly organized group having explicit objectives, formally stated rules and regulations, and a system of specifically defined roles, each with clearly designated rights and duties. . . Formal organizations include schools, hospitals, voluntary associations, corporations, government agencies, etc." (Theo, p. 287)

Organization, Informal.—"1. The system of personal relationships that develops spontaneously as individuals interact within a formal organization. Every formal organization has an informal aspect to its social organization, which is not planned and not formally stated. The informal social organization includes social norms, rituals, traditions, sentiments, and subgroups that influence the functioning of the formal organization but are not officially recognized." (Theo, p. 287)

Other Centered Activity.—"Activities of a personal nature and/or for which no other purpose can be identified." (USPHS #370, p. 2)

Pamphlet.—"A brief outline, treatise, or essay on a subject, often of current interest, published or printed, without a binding." (L, Exhibit 1)

Patient Centered Activity.—"Activities which focus on the patient and his care." (USPHS #370, p. 2)

Perception.—"1. The selection, organization, and interpretation by an individual of specific stimuli in a situation, according to prior learning, activities, interests, experiences, etc. Perception is a process and a pattern of response to stimuli. It is a function of the situational field, that is, of the total configuration of stimuli, as well as of previous social and cultural conditioning." (Theo, p. 295)

"Perception denotes sensory experience which has gained meaning or significance." (G, p. 491)

Periodical Literature.—"Written material appearing in publications, such as magazines, etc., that are printed at fixed intervals." (L, Exhibit 1)

Personnel Centered Activity.—"Activities which are directed toward unit personnel including students." (USPHS #370, p. 2)

Physician's Assistants.—"These types are distinguished primarily by the nature of the service each is best equipped to render by virtue of the depth and breadth of their medical knowledge and experience. The Type A assistant is capable of approaching the patient, collecting physical and historical data, and presenting them in such a way that a physician can visualize the medical problem and determine appropriate diagnostic or therapeutic steps. . . . He is distinguished by his ability to integrate and interpret findings on the basis of general medical knowledge and to exercise a degree of independent judgment. Type B assistant . . . possesses exceptional skill in one clinical specialty or, more commonly, in certain procedures within such a specialty. In his area of specialty, he has a degree of skill beyond that . . . by a Type A assistant . . . because his knowledge and skill are limited to a particular specialty, he is less qualified for independent action. . . Type C assistant is capable of performing a variety of tasks over the whole range of medical care under the supervision of a physician, although he does not possess the level of medical knowledge necessary to integrate and interpret findings. In a number of areas he is similar to a Type A assistant, but he cannot exercise the degree of independent synthesis and judgment. . . ." (NA, pp. 3–4)

Power.—"Power in its most general sense denotes (a) the ability (exercised or not) to produce a certain occurrence; or (b) the influence (q.v.) exerted by a man or group, through whatever means, over the conduct of others in intended ways. . . ." (G, p. 524)

Practical Nurse.—"Licensed practical nurse." (USPHS #370, p. 3)

Procedure.—"A particular way of accomplishing something" or . . . "a series of steps followed in a regular definite order." (W, p. 678)

Professional Authority.—"The competence of professionals to judge or analyze matters relating to their professions. Professional authority tends to be unchallengeable within its sphere, but is severely limited outside its area of competence. As the division of labor and the process of PROFESSIONALIZATION spread in society, the area of professional competence narrows, producing results not yet fully explored by sociologists." (Theo, p. 316)

Professional Nursing Staff.—"Graduate nurses (RN) who give direct care to patients." (USPHS #370, p. 3)

Profession(s).—"In its more general applications the term denotes occupations which demand a highly specialized knowledge and skill acquired at least in part by courses of a more or less theoretical nature and not by practice alone, tested by some form of examination either at a university or some other authorized institution, and conveying to the persons who possess them considerable authority in relation to clients." (G, p. 542)

"In the strictest sense of the term, a high status occupation comprised of highly trained experts performing a very specialized role in society. A profession has exclusive possession of competence in certain types of knowledge and skills crucial to society and its individual clients. The special intensive education and necessary discipline develops a strong ingroup solidarity and exclusiveness. Every profession, on the basis of its monopoly of knowledge and skills and its responsibility for the honor and perpetuation of the profession, tends to feel that it is by itself capable of formulating its ethics and judging the quality of its work. Thus, professional groups tend to reject the control of the public or clients they serve. Nevertheless, a profession is, of course, influenced by the public it professes to serve, and it is shaped by the needs of other interest groups, and by the demands of other professional organizations." (Theo, p. 316)

Progressive Patient Care.—". . . a system of organizing nursing and hospital facilities that attempts to provide each patient with the exact degree of care and supervision that he needs, according to the degree of his illness." (We, p. 73)

". . . is the systematic classification of patients according to their medical needs. These are the needs which can be met primarily by the physician, the nurse, and the facilities of the hospital." (Edward J. Thoms, We, p. 26)

". . . the organization of facilities, services, and staff around the medical and nursing needs of the patient. . ." (Faye G. Adbellah and Josephine Strachan, We, p. 34)

Registered Nurse.—". . . in carrying out the medical treatment prescribed by physicians, administer medications and treatment; observe, evaluate and record symptoms, reactions, and progress of patients; assist in the education and rehabilitation of patients; help maintain a physical and emotional environment that promotes patient recovery; instruct auxiliary personnel or students; and perform other duties concerned with the care of the sick and injured, prevention of illness, and promotion of good health. Nurses also engage in other activities such as research and serving on the staffs of nursing and community organizations. The various groups of nurses are hospital nurses, private duty nurses, office nurses, public health nurses, nurse educators, and occupational health or industrial nurses. A license is required to practice professional nursing. Diploma, baccalaureate and associate degree programs offer the basic education required for careers in registered nursing." (pp. 90–1)

Region.—"A large territorial area that is homogeneous in certain respects. The common element or elements on the basis of which the region is delimited may be geographic, economic, cultural or a combination of three." (Theo, p. 340)

"The term 'region' denotes a geographic area which either possesses certain homogeneous characteristics that distinguish it from adjacent areas or other regions, or which serves as a unit of government or administration." (G, p. 582)

Report.—"A record or an account of the transactions, in more or less detail, of the search for answers to problems in one particular setting, reflecting a more problemistic search than through a rigorous investigative effort." (L, Exhibit 1)

Response.—"The reaction or activity of an individual aroused by a STIMULUS." (Theo, p. 348)

"Response in its most general usage denotes any behavior or act of an organism which results from stimulus (q.v.) It is used occasionally to denote the giving and receiving of signs of appreciation and affection." (G, p. 598)

Role.—"A pattern of behavior, structured around specific rights and duties and associated with a particular STATUS position within a group or social situation. A person's role in any situation is defined by the set of expectations for his behavior held by others and by the person himself." (Theo, p. 352)

"As an aspect of social structure (q.v.) a role may be defined as a named social position characterized by a set of (a) personal qualities and (b) activities, the set being normatively evaluated to some degree both by those in the situation and others." (G, p. 609)

Self-Conception.—"An individual's self-conception is his view of himself. It is derived from taking the role of significant others in social interaction (q.v.)." (G, p. 630)

Social Structure.—"The pattern of interrelated statuses and roles found in a society or other group at a particular time and constituting a relatively stable set of social relations. It is the organized pattern of the interrelated rights and obligations of persons and groups in a system of interaction as analyzed in terms of statuses, roles, social norms, and social institutions. The term 'social organization' is sometimes used synonymously with social structure." (Theo, p. 395)

"In the sense in which Spencer and many more recent sociologists have used the concept, social structure refers to a more or less distinctive arrangement (of which there may be more than one type) of specialized and mutually dependent institutions . . . all evolved in the natural course of events as groups of human beings, with given needs and capacities, have interacted with each other . . . and sought to cope with their environment." (G, p. 668)

Social System.—"1. A social group or set of interacting persons or groups, conceived of as distinct from the particular persons who compose it. A social system includes a SOCIAL STRUCTURE of interrelated statuses and roles and the functioning of that structure in terms of patterns of actions and interactions. Thus the social system includes process and change and the active consequences and modifications of interaction as well as structure and stable forms." (Theo, p. 395)

"A social system is the system constituted by the interaction of a plurality of individual actors whose relations to each other are mutually oriented. . ." (G, p. 670)

Sociometry.—". . . is a form or field of social psychology which emphasizes the quantitative aspects of interpersonal phenomena—with special concern for the measurement of preferences." (G, p. 684)

Standby Time.—"A period of inactivity during which the nurse is not free to engage in other activities; for example, a nurse who is chaperoning the physical examination of a patient. Instruction to students is classified as Standby provided that the student nurse is not engaged in any other activity while listening to the instructor." (K, p. 16)

Staff.—". . . the officers chiefly responsible for the internal operations of an institution or business." (W, p. 851)

Status.—". . . denotes (a) position in a social system (q.v.) involving reciprocal expectation of action with respect to occupants of other positions in the same structure; (b) place with respect to the distribution of prestige within a social system, and sometimes, by implication, with respect to the distribution of rights, obligations, power, and authority within the same system—as in the phrases 'high status' 'low status'; (c) high place with respect to the distribution of prestige within a social system. . . ." (G, p. 692)

"A defined position in the SOCIAL STRUCTURE of a group of society that is distinguished from and at the same time related to other positions through its designated rights and obligations." (Theo, p. 415)

System.—"An organization of interrelated and interdependent parts that form a unity. A system is a conceptual MODEL used to facilitate investigation and analysis of complex phenomena." (Theo, p. 431)

Systems Analysis.—"A theoretical approach of importance in many scientific disciplines, in which emphasis is placed on analysis in terms of organization and interrelationships rather than on the study of separate units or entities.

"In contrast to earlier mechanical or organismic-type models, modern systems models emphasize the

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integration of the sociocultural system in terms of networks of information and communication. Thus, systems analysis in sociology is closely allied with CYBERNETICS and INFORMATION THEORY. Another important characteristic of systems analysis is that, by conceiving of systems as involved in a constant process of adaptation to their environment and internal reorganization, the attempt is made to build into the model conceptions of conflict, change, and process. Thus systems analysis attempts to avoid the criticisms of excessive emphasis on equilibrium and integration leveled at FUNCTIONALISM. (See W. Buckley, *Sociology and Modern Systems Theory,* Prentice-Hall, Englewood Cliffs, N.J., 1967)" (Theo, pp. 431–2)

Task.—". . . a usually assigned piece of work often to be finished within a certain time." (W, p. 903)

Technician.—A "specialist" in the technical details of an "art or other area of specialization." (W, p. 905)

Term Paper.—"A written paper usually prepared to meet a specific course assignment, which is usually more limited in scope than a thesis; as a rule, the investigation is made in the library and seldom involves laboratory research or field study." (L, p. 3)

Thesis.—"A standard written requirement in many colleges and universities for postgraduate degrees, which is the account of his investigation into a problem or project selected by him, his chairman, and the thesis committee." (L, p. 3)

Trait.—". . . any attribute of persons which is possessed in differing amounts by different members of a group or class. It is a physical characteristic or a relatively stable mode of behavior. Such things as height, intelligence, quality of handwriting, or understanding of chemical principles are traits." (A, p. 467)

Unclassified Activities.—"Activities eliminated by definition from classification under any other code level." (USPHS #370, p. 2)

Unit-Centered Activities.—"Activities concerned with maintaining a safe and well ordered environment." (USPHS #370, p. 2)

Unit Manager.—"An administrator at the ward or unit level who assists the nurse and/or the physician in providing an effective therapeutic regimen. A unit manager may be responsible to either hospital administration or nursing administration." (AAA, p. 167)

Ward.—". . . a division in a hospital." (W, p. 1003)

Ward Clerk.—"Prepares and compiles records in hospital nursing units. . . . Records name of patient, address, and name of attending physician to prepare medical records on new patients. Copies information, such as patient's temperature, pulse rate, and blood pressure from nurses' records onto patient's medical records. Records diet instructions. Keeps file of medical records on patients in unit. Prepares notice of patient's discharge to inform business office. Keeps records of absences and hours worked by unit personnel. Requisitions supplies designated by nursing staff. Answers telephone and relays messages to patients. Directs visitors to patients' rooms. Distributes mail, newspapers, and flowers to patients. May compile census of patients. May assist in patient care and services. . . ." (DOT, p. 135)

APPENDIXES AND BIBLIOGRAPHY

Section III

Appendix A

PROJECT: Screen, Review, and Critique Relevant Research, Studies, and Approaches focused on Measuring Nurse Staffing Needs in Hospitals, NIH 7Q-4193.

NURSE-STAFFING REQUIREMENTS RESEARCH
WORK SHEET - REVIEW AND CRITIQUE

Local Source: ____________________

Author or Investigator: ________________________________
Last Name First Name Initial

Biographical Data:

Title of Article:
Title of Book:
Title of Report:

Publisher or Source:

Support By:

Date:

Volume, issue, page number:

Study Summary:

Purpose, Methodology (Sample, Instruments and Procedure), Results

Appendix B

PROJECT: Screen, Review, and Critique Relevant Research, Studies, and Approaches focused on Measuring Nurse Staffing Needs in Hospitals, NIH 70-4193

NURSE-STAFFING REQUIREMENTS RESEARCH
WORK SHEET - REVIEW AND CRITIQUE

Local Source: ____________________________

Author or Investigator: ____
Last Name First Name Initial

Biographical Data:

Title of Article:
Title of Book:
Title of Report:

Publisher or Source:

Support By:

Date:

Volume, issue, page number:

RESEARCH REVIEW

I. Significance and Impetus for research:

II. Methodology:

A. Specific questions or/and hypothesis:

B. Type of Research Design: Appropriateness and replication possibilities.

C. Study Population: Sampling Technique and Adequacy.

D. Data Collection: Tools and Instruments, validity-reliability and prediction precision.

E. Data Analysis: Appropriateness and Adequacy of Method.

III. Findings and Results: Method of Expression.

Theoretical framework and comparisons
IV. Interpretation: Relevance to original questions
Completeness
Implications

RESEARCH CRITIQUE

1. Is the research study sound and logically clear? Are the findings based on the data? Are the data obtained through reliable, sensitive, and valid means?

II. How does the study make a significant contribution? What insights have been advanced? Does it contribute to knowledge? Are the variables measured affecting patient care?

III. Has the study been replicated? yes ☐ no ☐ If yes, where?

IV. How was the impact of the study on the institution determined? Was there no impact?

Appendix C

PROJECT: Screen, Review, and Critique Relevant Research, Studies, and Approaches focused on Measuring Nurse Staffing Needs in Hospitals, NIH 70-4193.

Local Source:

Summary Instrument: Studies, Research and Developments in Nurse Staffing

Name of Investigator:

Title and Source of Report:

I. Relevance of Study to Nurse Staffing.

A. Directly related to:

1. Measurement of patient care requirements.

__________ yes

__________ no

__________ other (comment) ______________________________

____

2. Measurement of nursing activity

__________ yes

__________ no

__________ other (comment) ______________________________

____

3. Prediction of Nursing Staff Requirements (comment).

__________ yes ____

__________ no ____

__________ other ______________________________________

B. Indirectly related to:

__________ 1. Patients and their requirements for care.

__________ 2. Variables affecting the work of nurses.

__________ 3. Variables affecting personnel welfare or resulting from welfare.

__________ 4. Other (comment) ____________________

II. Variables. (Indicate by use of symbols, the nature of the variables: d= dependent; i= independent; and c= confounding)

A. Personnel

__________ 1. Qualifications

__________ 2. New Educational Program or Program Changes (for example, Inservice)

__________ 3. Combination of Classifications (Mix)

__________ 4. Total Number of Individuals

__________ 5. New Nursing Positions (specify) ____________
(title)____________

__________ 6. Cost of Staff

__________ 7. Other (specify) ____________________

____

B. Number of Hours per Patient per Day

__________ 1. Total Hours per day (unclassified)

__________ 2. Total Hours per day by patient classification

__________ 3. Total Hours per day by personnel classification

C. Staff Welfare

__________ 1. Satisfaction or Dissatisfaction

__________ 2. Morale

__________ 3. Absenteeism (specify) ____________________

____

__________ 4. Resignations

__________ 5. Transfers

__________ 6. Transfer

__________ 7. Other (specify) ____________________

____

D. Nursing Activity

__________ 1. Pattern of Activity (Classes of Tasks)

__________ 2. Time Requirements

__________ 3. Number of Specific Tasks

__________ 4. Quality of Performance

__________ 5. Other ____________________

____

E. Patient Welfare

__________ 1. Length of Hospital Stay

__________ 2. Satisfaction or Complaints

__________ 3. Clinical Measures (specify) ____________

____

__________ 4. Nonclinical Measures (specify) ____________

____

__________ 5. Other (specify)

F. Classification of Patients

__________ 1. Clinical Units or Divisions

__________ 2. Degree of Illness

__________ 3. Cost per patient day

__________ 4. Other ____________________

G. Environmental Variables

______________ 1. Architectural features of Nursing Unit
(specify) ______________________________________

______________ 2. Supporting Services (specify) ____________________

____

______________ 3. Physician Impact (specify) ______________________

____

______________ 4. Introduction of New or Additional Nonnursing positions
(specify ______________________________________

____

______________ 5. Other ______________________________________

H. Other Variables (specify) ______________________________________

____

III. The Nature of the Study

A. Type

______________ 1. Description of Methodology only (Plan of Program)

______________ 2. Project or Demonstration

______________ 3. Descriptive and Explanatory (Nonpredictive)

______________ 4. Predictive (Controlled Experimental)

______________ 5. Other

B. Tools Used

1. Observation Records

______________ a. Time record

______________ b. Motion record

______________ c. Work or Task Sampling record

______________ d. Procedure flow charts

______________ e. Other (specify)

2. Self-Report

____________ a. Estimates of Time

____________ b. Diary or Log

____________ c. Work or Task Report

____________ d. Other (specify) ____________________

____

3. Interview (describe briefly)

____________ a. Structured ____________________

____________ b. Unstructured ____________________

4. Questionnaire or Opinionnaire (describe briefly) __________

____

5. Other (specify) ____________________________

____

C. Design (comment to clarify)

____________ 1. Standard Program

____________ 2. Survey

____________ 3. Before and after group design (nonexperimental)

____________ 4. Before and after one group design (experimental)

____________ 5. Two or more group design (experimental)

____________ 6. Other (specify) ____________________

____

IV. Feasibility of Application to Staffing Methodology in Hospitals

A. Is a particular type of setting required?

____________ 1. No

____________ 2. Yes (specify)

__________ a. large urban hospital

__________ b. small rural

__________ c. medical center

__________ d. other

B. Are the tools reliable and valid?

__________ 1. no (specify) ____________________

____

__________ 2. yes (specify) ____________________

____

C. Are the tools specific and clear enough so that they can be reproduced?

__________ 1. no (specify) ____________________

__________ 2. yes (specify) ____________________

D. Is the methodology (including tools) such that nonspecialized personnel can readily learn to use it?

__________ 1. no (specify) ____________________

__________ 2. yes (specify) ____________________

E. Are specialized personnel required for the use of instruments and analysis of data?

__________ 1. no

__________ 2. yes (specify requirements) ____________________

____

F. What is the cost estimate of the methodology, including reproduction of tools?

__________ 1. low (under $1,000)

__________ 2. moderate (between $1,000--$2,000)

__________ 3. high (over $2,000)

G. Is the study effective to the extent that it should be considered in the development of nurse staffing methodology?

__________________ 1. yes

__________________ 2. no (specify) ________________________________

__________________ 3. other (specify) ______________________________

V. What is the innovative feature of the research?

VI. What pertinent issues or problems are suggested by the report?

VII. What are the significant variables or baseline data used in the report that should be considered in nurse staffing prediction?

VIII. What is the overall merit of the report?

Appendix D

Project Staff and Periods of Appointment[1]

Myrtle K. Aydelotte, R.N., Ph.D. (Education, University of Minnesota) Project Investigator, June 1970 through December 1971

Eloise A. Leinfelder, R.N., M.A. (Nursing, University of Iowa) Research Associate, November 1970 through December 1971

Sharon B. Ormsby, R.N., M.S. (Counseling, Illinois State University) Research Associate, September 1970 through August 1971

Suzanne Hanson, R.N., M.A. (Nursing, University of California at San Francisco) Research Assistant, July 1971

Dixie L. Reed, R.N., M.A. (Nursing, University of Iowa) Research Assistant, July 1970 and August 1970

Elizabeth Swanson, R.N., B.S. (Nursing, University of Iowa) Research Assistant, August 1971

Nancy Hamilton, R.N., B.S. (Nursing, University of Iowa) Research Assistant, November 1971 through December 1971

Cheryl L. Corpenning, Secretary, August 1970 through November 1970

Mary L. Perdue, Secretary, November 1970 through August 1971

Lois A. Gerard, Secretary, September 1971 through December 1971

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[1] Except for short periods, all personnel were assigned to the project part time. The two research associates were half time or more during their employment. Funds for payment of the staff were provided by NIH 70-4193, the University of Iowa Hospitals and Clinics, and the investigator.

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The bibliography includes a listing of all the literature coming to the attention of the staff from one source or another. The rationale for the inclusion of an item in this bibliography was that the item was seen to be in some way related to staffing by one of the many sources contacted by the research staff. Therefore, the research staff believed it advisable to include the title. Not every piece was examined. As stated in chapter 2 "The Method of Study," some pieces were eliminated on the basis of title alone.

This listing has been edited as carefully as time permitted. It was not always possible or feasible to trace all the information one would wish to include in such a listing. Therefore, dates and publication sources may be missing. The identifying information on the materials reviewed and critiqued and that referred to in the text of the final report and in section II is complete.[1] Research support provided through the USPHS is identified by numbers in parentheses. Other research support is written out in detail. If some research support is not acknowledged, it is because the source failed to list it or it could not be readily identified.

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